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The Privilege to Cooperate:

Assessing the Impact of Collaborative Resource Management Agreements on Local Communities' Livelihoods around Mount Elgon National Park, Uganda

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1. Introduction

"[T]he road to sustainable rural life must be lit by the lamp of local knowledge." [1]

1.1 Background to the problem

Understanding and fighting poverty in rural Africa requires a differentiated and precise analysis of region-specific factors. One such factor is the presence of a protected area, be it in the form of a national park, a forest reserve or a wildlife sanctuary. This is important to consider in the fight against poverty because protected areas considerably restrict the rural poor's access to local environmental resources.

Yet, for their daily livelihoods these people often depend to a large degree on resources such as forests, grazing and crop land, fisheries, and irrigation water. The local commons also provide some form of insurance for the rural poor as a fallback source of food and fodder in bad crop years (Bardhan and Udry 1999). However, poverty, above all food shortage and the lack of alternative income generating activities may drive people to unsustainably and extensively extract the very resources they rely upon for their daily lives. Consequently, the degradation of local environmental resources on the one hand and their widely promoted protection on the other hand lead to a sharp limitation of access to those resources, which in turn leads to a further worsening of rural people's living conditions.

Mount Elgon National Park (MENP) on the border between Uganda and Kenya is a typical example for the clashing interests of conservationists aiming at protecting the park's unique biodiversity, and local people depending on its environmental resources. Having first been gazetted a forest reserve in 1938, its status was changed into national park in 1993. This change in legal status led to a strict ban for local people to both extract resources from the forest and to access the forest for clearing crop land and grazing their cattle. However, people continued to encroach on MENP in the years after 1993, as they haven't been offered compensation for their losses or alternative ways of generating income by the park authority. Consequently, conflicts (at times resulting in severe or even fatal injuries for both park staff and local people) arose that hardened over time and continue to surface today. Solving the

[1] Source: Geertz (1983) quoted in Sanderson (2005: 328)

dilemma of conservation and development in rural areas of developing countries has thus become one of today's most important but also highly contentious tasks for national and international actors as well as for non-governmental development organizations.

Undertaking conservation efforts in developing countries in general, and in Uganda in particular, has long been the exclusive task of government-appointed authorities. Yet, strictly public approaches, most commonly known is the 'Fortress Conservation' approach, have proven unsuccessful in the management of conflicting priorities of human development and biodiversity conservation. As has been typical for this approach, local people have been systematically evicted from protected areas and excluded from the park management in favor of an all too strict focus on conservation of natural resources and wildlife (Sletten et al. 2008). However, throughout the years, attempts at confronting the one-sided and discriminating management of parks and reserves have led to the emergence of various types of 'Community Conservation', an approach where local inhabitants are actively involved in decision making and management of the protected area's resources.

As a result of this development, two community conservation instruments are complementing the Uganda Wildlife Authority's park policies today. Firstly, according to MENP's latest general management plan, 20% of the park entry fees shall go to local community development projects (UWA 2009), and secondly villages directly bordering MENP are encouraged to negotiate so-called 'Collaborative Resource Management Agreements' (CRMA) that are usually accompanied by 'Boundary Management Agreements' (BMA). These agreements are meant to regulate the otherwise illegal and unsustainable use of the park's natural resources as well as to ease communities' hardship and to engage them actively in the conservation of the park's resources.

CRMAs were introduced shortly after the Mount Elgon forest reserve was declared a national park and the number of active agreements grew temporarily up to as many as 60, corresponding to a coverage of almost 100% of the entitled communities. Ever since their introduction, CRMAs attracted a lot of academic interest and were commonly considered a promising solution to the park-people conflict, not only by the Ugandan government and the local people themselves but also by many scholars (Norgrove 2002).

However, after receiving plenty of attention in the late 1990s and the beginning of the millennium, today surprisingly little is known about the accurate implementation and actual impacts of these resource use agreements.

1.2 Research objectives

Overall objective of this thesis is to find out whether collaborative resource management agreements lead to tangible economic benefits in the communities where they are implemented. Yet, before doing so it will be investigated how many of these agreements are still in place and what the conditions are to (successfully) negotiate an agreement with the Ugandan Wildlife Authority.

According to a staff member of the park administration[2], 16 parishes bordering MENP have an active CRMA today, which is considerably less than in the early 2000s. However, this makes examining how villages with agreements cope in terms of income generation and dependence on forest environmental income compared to villages without agreements possible. It is particularly interesting to answer the question of how income, composed of forest environmental income and other forms of income, measured both in cash and subsistence terms, differs across households situated in villages with and without CRMAs. Furthermore it will be analyzed if livelihood strategies vary systematically across villages participating in CRMAs as compared to other villages not participating in collaborative resource management. Then it will be examined whether inequality and poverty measures differ across villages with and without agreements, and if this is the case, what the corresponding mechanisms at work are. Lastly, if CRMAs have a significant effect on livelihood activity choices across the different communities, it is worth finding out who within a participating village is mostly benefiting from the agreement and how and why this is happening, resulting in profiling a typical beneficiary of a resource access agreement.

As with all 'with versus without' investigations, however, the validity of one's statistical inferences depends on the specific assumption that the assignment of households to treatment and control groups is not related to other factors that may have determined outcome. Yet, recent work indicates that "the process of site selection is highly political" (Cavanagh 2011: 27). Thus, in order to draw valid conclusions on the impacts of CRMAs it will be also investigated how the Ugandan Wildlife Authority was targeting villages that have active CRMAs. This will help to determine whether differences across study sites are due to selection or due to actual impact of CRMAs.

[2] Source: internal document by the Ugandan Wildlife Authority, received 29th March 2011

1.3 Justification of the study

According to the International Union for Conservation of Nature's (IUCN) categorization of protected areas, national parks impose "considerable restrictions on human use and occupation" (West et al. 2006: 251), and deny people "traditional usufruct rights of considerable economic importance" (Vedeld et al. 2007: 870). This knowledge, paired with Norgrove and Hulme's (2006) description of the area around MENP as densely populated, scarce of fertile land and physically isolated, hints at the substantial constraints that protected areas pose on local people's efforts to improve their already vulnerable livelihoods.

Therefore, a thorough analysis of CRMAs, being one of very few policy instruments aiming at the mitigation of adverse effects caused by protected areas, is considered important to reactivate critical discussion and scrutiny on the issue of community conservation around Mount Elgon National Park. Results of this study might help to reconsider the make-up of those agreements and give an idea of how they can be modified so as to better address local communities' needs. This becomes even more important when considering the fact that park community relations at MENP are among the most conflictual in East Africa with many of the disputes being far from solved. As can be read in Alden and Anseeuw, "the absence of any systematic analysis of land conflicts, and the integration of these insights into sound policies and post-conflict reconstruction strategies, potentially contributes to the perpetuation of the conditions which fuel conflict" (Alden and Anseeuw 2010: 2).

1.4 Thesis structure

The thesis is divided into six main chapters. The second chapter contains a thorough literature review, as well as a detailed introduction to the conceptual framework used for the analysis in chapter five. The third section contains a description of the study site, while chapter four comprises of a discussion on the methods used for collecting and analyzing the data. Chapter five contains a detailed presentation, analysis and interpretation of the study results, and chapter six concludes with some recommendations for policy making and future research.

2. Conceptual framework and literature review

"[I]t is typically the people who are most dependent on a forest who make the best managers of that forest."[3]

The conceptual framework chosen for this work is mainly based on the 'Sustainable Rural Livelihoods Framework' as defined by Scoones (1998), and further elaborated by Ellis (2000). It will be discussed in the first part of this chapter, and then successively extended by a number of other theoretical considerations. These considerations deal with the different roles of forest environmental income for rural livelihoods, the specific drivers behind forest dependence, and how rural livelihoods are affected by protected areas. The last section then contains an introduction to the concepts of community conservation, followed by a brief presentation of the particular collaborative management instruments used around MENP.

2.1 The sustainable rural livelihoods framework

The main purpose of a sustainable rural livelihood framework is to convey insight into how rural households make economic decisions. These decisions, either made out of choice or necessity, depend on the household's access to assets and shape specific livelihood strategies. Thereby, a "livelihood comprises the assets (natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household" (Ellis 2000: 10). Yet, whether a livelihood is sustainable or not depends on its ability to cope with and recover from stresses and shocks, as well as to maintain or enhance its capabilities and assets, while not undermining the natural resource base (Scoones 1998).

Before the framework will be further elaborated, a look at Figure 1 helps to grasp how the different building blocks of the framework are interrelated and how each of those elements contribute to the analysis of a particular set of questions concerning rural poor's livelihoods.

[3] Source: Poffenberger (1990) quoted in Scott (1998: 6)

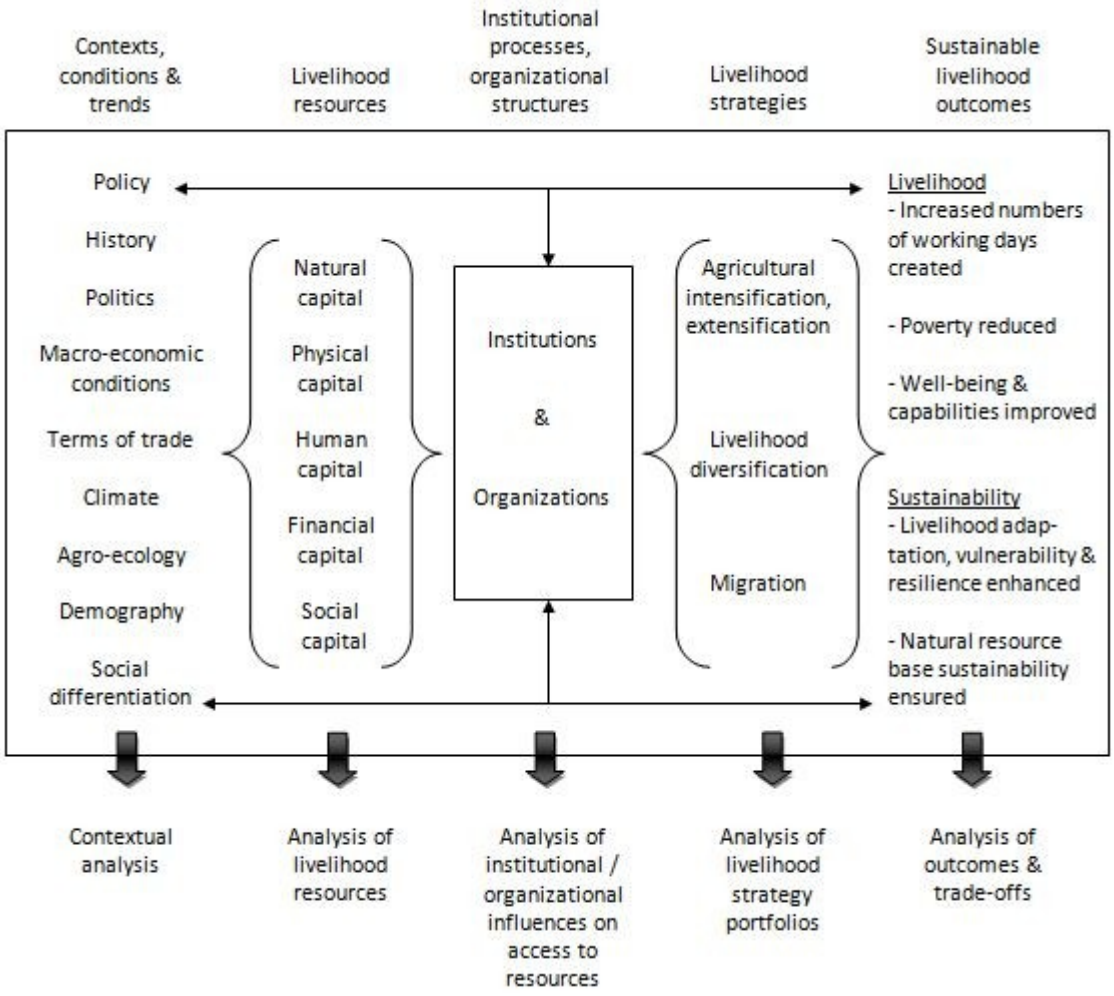


Figure 1: Sustainable rural livelihoods framework. Source: Scoones (1998: 4)

To begin with, assets that can be either owned, controlled, claimed or accessed by households, are defined as stocks of different types of capital that can be utilized "to generate the means of survival of the household or to sustain its material well-being at differing levels above survival" (Ellis 2000: 31). Even though various distinctions exist, for the purpose of this thesis, assets were classified in a rather simple fashion, namely into natural, physical, human, financial and social capital. A wide range of literature exists about each of the five capitals, yet discussing the differing definitions and measurement techniques for all of them is beyond the scope of this thesis. Hence, brief definitions are given, all of which are amenable to academic dispute.

Natural capital comprises of natural resource stocks such as soil, water, air and genetic resources (plants and animals), as well as environmental services (Scoones 1998), and is utilized to generate different means of survival. In the context of this thesis natural capital is

ascribed special attention, as it contributes significantly to the main livelihood activities of the rural poor, namely cultivating land, keeping livestock and collecting forest environmental products. Its access is moreover considerably restricted by the Ugandan government's conservation policies. And as will be acknowledged subsequently, restricted access to natural capital in a situation where there are only a few assets available is a major constraint for rural people to adapt and improve their livelihoods.

Physical capital can be understood as asset that is created by economic processes such as machines, buildings, roads and irrigation canals. It is often also referred to as producer goods, as opposed to consumer goods, and can be used to generate a "flow of outputs into the future" (Ellis 2000: 33). In economic theory, it is said to be able to substitute for natural capital, but only to a limited extent as will be shown later.

Human capital refers to a person's status of knowledge, skills and health. In a rural context, it furthermore refers to the 'amount' of labor available to a household, i.e. the household size. Especially where labor markets do not work optimally, a bigger household size may increase the household's chances to pursue a variety of different income generating activities. As will be shown later, diversification of income strategies is a key feature of rural households (Reardon 2000; Ellis 2000).

Financial capital comprises of stocks of accessible money, for instance in the form of savings or access to loans, or other stocks of assets that may be converted into cash money, such as livestock, jewelry and food stocks. It is more likely to identify financial capital of the latter type in rural peasant societies, as there is a general lack of access to formal money lending institutions.

Lastly, social capital comprises of all "the social resources (networks, social claims, social relations, affiliations, associations) upon which people draw when pursuing different livelihood strategies requiring coordinated action" (Scoones 1998: 8). An example would be the membership in a farmer's cooperation in order to better market products, or as found in the Mount Elgon sample, the membership in a beekeeping association, to pool resources and efforts more efficiently. Family ties and kinship relations are also understood as social capital.

However, the availability of these assets alone does not make a livelihood strategy. Rather, it is the active and proper combination of assets that people have access to, modified by institutions and organizations, and embedded in specific contexts of trends and shocks, that makes a particular livelihood strategy. According to Scoones (1998), they can be distinguished into three broad groups, namely migration, agricultural intensification or

extensification, and livelihood diversification; and be pursued either separately, in combination or in sequence. Among those strategies livelihood diversification, defined as the extension of livelihood activities to a number of off- and non-farm activities, with forest product utilization being one of those activities, will be of biggest interest for what follows.

The translation process between resources and livelihood strategies on the one hand and the realized livelihood outcomes on the other hand, mediated by a large number of "contextual social, economic and policy considerations" (Ellis 2000: 37) is possible because of institutions, such as social structures and societal norms of both formal and informal character, and organizations that comprise of both non- and governmental actors. One such organization is the Ugandan Wildlife Authority, executing Ugandan law around MENP, and consequently affecting livelihood outcomes of the local communities.

Finally, livelihood outcomes are discussed with regard to five key themes given special attention to by Scoones: (1) the creation of working days, (2) poverty reduction, (3) well-being and capabilities, (4) livelihood adaptation, vulnerability and resilience and (5) natural resource base sustainability. In fact, each of these outcomes can be discussed in a separate thesis, but in this work the focus will be restricted to the topics of poverty reduction (as will be discussed in section 5.5 on distribution) and livelihood adaptation, vulnerability and resilience (as will be partly discussed in section 5.3 on diversification, and in section 5.4 on forest dependence).

Before theoretical considerations on livelihood diversification will be elaborated on, it needs to be mentioned that results gained from a livelihood study may differ considerably according to the scale at which their assessment took place. While a particular livelihood activity might have positive outcomes for an individual, it can lead to highly unsolicited outcomes on an aggregate level. It is therefore important to keep the scale of analysis – individual, household, village etc. – in mind (Scoones 1998).

2.2 Diversification of rural livelihoods

According to Ellis, "[r]ural livelihood diversification is defined as the process by which rural households construct an increasingly diverse portfolio of activities and assets in order to survive and to improve their standard of living" (Ellis 2000: 15). By choosing the verb 'to

survive' Ellis indicates that diversification may occur as an involuntary response to crisis, whereas the term 'to improve their standard of living' points towards diversification as a deliberate household strategy. Furthermore, a "frequent finding of livelihoods research is that individual level diversity tends to characterise the diversification strategy of poorer households, while household level diversity combined with occupational specialisation tends to characterise the diversification strategy of better off households" (Ellis 2000: 5). Lastly, diversification occurs not only between farm, off- and non-farm activities but also in terms of on-farm investments. This is because "risk may cause the production of diverse food crops being preferred to specialization in a single cash crop" (Ellis 2000: 57).

In this thesis particular emphasis is placed on forest environmental activities as being among the most important livelihood activities in rural poor's diverse livelihood portfolios. Therefore, the next section deals with the particular roles forest environmental income may take on in rural livelihood strategies.

2.3 The role of forest environmental income in rural livelihoods

In the literature, the roles forest environmental income can play in the poor's livelihoods are often distinguished into three categories: (1) serving as a safety net, (2) supporting current consumption and (3) reducing poverty (Vedeld et al. 2004). Thereby, the first role means that "forest products are used to overcome unexpected income shortfalls or cash needs", whereas the second role can be understood as some kind of 'coping strategy' in which forest products are used to maintain a current level of consumption and keep a household from falling into deeper poverty (Vedeld et al. 2004: 12). Lastly, forest products may provide a way to raise household income either through a 'stepping out' or 'stepping up' strategy (Vedeld et al. 2004). So far, the role of forest environmental income as an 'out of poverty' strategy has been confirmed only in a small number of studies, e.g. recently in a southern Africa context by Shackelton & Shackelton (2006). Yet, the majority of the studies dealing with forest environmental income could rather confirm its importance as a 'safety net' and / or 'consumption support' strategy (Vedeld et al. 2004).

Other academics assign forest resource collection the role of an 'employment of last resort', i.e. a low-return income opportunity. The model is illustrated in Figure 2 and discussed in the paragraphs to follow, and mainly based on Angelsen and Wunder (2003).

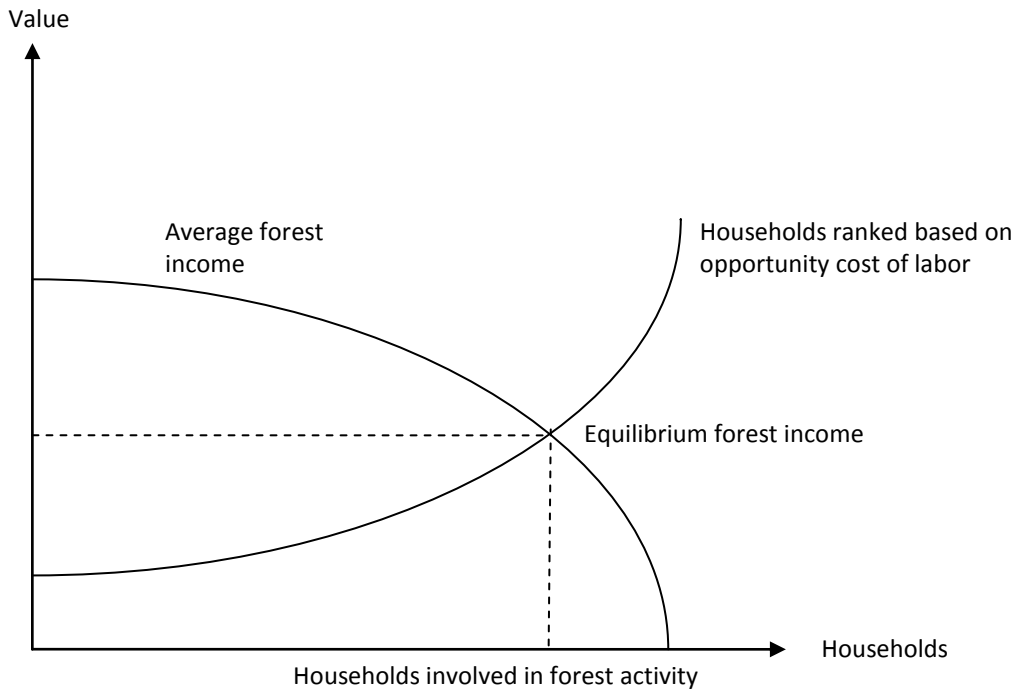


Figure 2: The 'Employment of Last Resort' Model by Angelsen and Wunder (2003)

In this model it is assumed that all households in a village are ranked according to their opportunity cost of labor. Then, those with the lowest opportunity cost, i.e. those with no or bad non-forest income opportunities, are found to the left of the curve. The rising curve shows the increase in opportunity cost, as one moves to the right of the *x*-axis. Since opportunity cost of labor and income are strongly correlated, it is the poorest households that tend to be to the left side of the figure. The declining curve shows forest income per household, which is a function of many factors: e.g. the resource base, technology, and market prices. More importantly, forest income is a function of the number of people involved in forest activities, which is why it declines with an increasing number of households participating in it. Thus, competition for forest resources will at a certain point lead to lower average forest income.

Now, how many people will get involved in forest activities? It is the activity with the highest return to labor that people choose when deciding on an income activity to pursue. Hence, those with the lowest market value of labor will get involved in forest activities, i.e. all those households that are to the left of the point where the two lines intersect. This is also because forest activities do neither require high entry costs, nor particular skills or a lot of capital, making it attractive to the poor but also keeping them in a low-return-activity, which is why this model is called the 'Employment of Last Resort' model.

As all models do, this model strongly simplifies reality and rests on three major underlying assumptions, namely that (1) all households receive the same share of forest income; (2) forest income and the number of people involved are negatively correlated, ruling out net economies of scale in processing, management or marketing; and (3) seasonal fluctuations of labor demand are not taken into account (Angelsen and Wunder 2003). However, even more sophisticated elaborations would not alter the main insight from this model, namely, that households with poor asset endowments resort to low-return activities such as forest product collection or agricultural piecework, while better endowed households will engage in high-return employment.

An implication of this model is that forest environmental income has an equalizing effect on the income distribution, as it serves as income source for the poorly endowed that would otherwise have difficulties to find employment yielding any significant returns.

However, this "does not mean that all forest activities are low-return ones with poor prospects for socioeconomic advancement" (Vedeld et al. 2004: 18). With the right conditions in place specialization in forest product utilization can contribute considerably to improved livelihoods of already better endowed households.

2.4 Dependence on forest environmental income

Still, once poor households resort to the collection of forest environmental products as part of their particular livelihood strategy, it is difficult for them to find an easier and cheaper way of earning income. To which degree the rural poor rely on the forest, however, depends on some crucial characteristics that are identified and discussed in the next paragraphs, broadly following theoretical reflections by Scott (1998).

Indicators of forest dependence that emerged from extensive empirical research are: (1) distance to the park boundary, (2) economic well-being of the household, (3) age of the household head or generational affiliation respectively, (4) gender, and (5) whether or not a household belongs to a specialist (user) group (Scott 1998).

To begin with, the distance to the park boundary will be examined. At first glance, the direction of causality may seem clear: the closer a household is situated to the park the more incentives there are to go to the forest and collect resources, and the more dependent a household becomes. Yet, it might be equally likely that households that are more dependent

on environmental income settle closer to the park than other households do, so as to better access the forests resources used for income generation. In any case, those living closer to the park are, supported by extensive empirical evidence, found to be more dependent on its resources.

A difficult question to figure out in this regard is the distance at which the cost of travelling approximately outweighs the benefits of access to the forest. Scott remarks accordingly that the "influence of distance will result in a forest-dependence continuum and consequently hard and fast boundaries between users and non-users cannot be identified" (Scott 1998: 60). If considerations on distance are moreover paired with other factors, for instance the economic situation of a household, more ambiguous patterns prevail. Households that strongly depend on the forest for income generation accept longer distances in order to collect forest resources. Also, if forest products are explicitly collected in order to be sold and to generate cash income, patterns are different from situations in which it is mainly collected for subsistence purposes. It must be furthermore distinguished between forest products in general and particular products. If a product is of great importance and difficult to substitute, dependence might persist even over longer distances. Examples for such resources in the Mount Elgon context are Bamboo shoots and stems. Firewood however, is a resource more easily substituted by other products and thus much more influenced by forest proximity.

The second factor influencing the dependence on forest products is the household's economic wellbeing, which is exercising a more complex effect on dependence than distance. Intuitively, it makes sense to assume that richer households depend less on forest products than poorer ones. In practice this hypothesis needs to be altered in order not to give ambiguous results, that is to say that it must be distinguished into absolute and relative contribution to income. Then, in absolute terms, richer household depend to a similar degree on forest products for income generation as poorer households do (Scott 1998), be it cash or subsistence income that is considered. In relative terms, however, considerable differences in the degree of dependence prevail, with poor households gaining tremendous shares of income from forest environmental income (Vedeld et al. 2004; Katto 2004).

Concerning age and dependence, different hypotheses have been developed. On the one side, younger households can be expected to be more dependent on forest products as they are utilizing forest income to establish themselves financially. Also, being younger, healthier and stronger can be interpreted as having a comparative advantage. On the other hand older

people are often less educated than the younger generation and thus have fewer alternatives for generating incomes other than from subsistence farming, which may work as a strong incentive to rely on environmental income for a living. Also their health status may prohibit the execution of other more physically demanding activities, such as riding a bicycle taxi, engaging in agricultural piecework, or working as a carpenter and so forth. Yet, according to Scott empirical work could not confirm any of those hypotheses on the influence of age on the dependence on forest environmental income unequivocally (Scott 1998).

Next, the impact of the household head's sex will be discussed. According to the particular resources women and men are allowed to pick, a stronger degree of dependence on resources collected by women can be expected in female-headed households and vice versa. This is also the case around MENP, where firewood is for example strictly collected by women, while only men can collect herbs and medicinal plants.

In which way this affects the household's well-being depends on other aspects as well, but it needs to be kept in mind that female-headed households often suffer from a lack of adult male labor and lower access to employment away from family (Scott 1998; Tumusiime 2011), probably inducing them to resort even more often to 'last resort employment' than similarly endowed male-headed households.

The last factor to be looked at is that of being a specialist user. Specialist users are often integrally linked to the forest resources through their choice of income generating activities. For example, someone making bamboo baskets or keeping bees in bamboo beehives depends to a considerable degree on utilizing bamboo and thus on the regular access to the forest.

Other factors, not incorporated in Scott's model, were mentioned to be of importance for explaining forest dependence. Those include low education and poor access to crop land (Vedeld et al. 2004) and as was discussed above, the lack of access to them may induce people to resort to forest resource utilization, an activity not requiring any of those assets.

2.5 Community conservation

In what follows, theories on rural livelihoods and forest environmental income are augmented by considerations on community conservation, serving the analysis of constraints and opportunities that arise from living adjacent to protected areas.

Community conservation developed because non-participatory 'fines and fences' efforts turned out not to cope sufficiently with the needs of communities neighboring protected areas. According to Barrow et al. (2001), protected areas in sub-Saharan Africa have been mostly established without the participation or consent of the local people and often involved their forced eviction, resulting in major impediments to their pursuit of traditional livelihoods.

By the time conservation and development was no longer perceived as being mutually exclusive but rather constituting a win-win situation, theoretical considerations on sustainable rural livelihoods and forest dependence have been integrated into new conservation approaches, resulting in a manifold selection of community conservation instruments. In today's scientific literature, three major community conservation approaches are found to be dominant in the sub-Saharan Africa context, most commonly classified as presented in the Table 1.

Table 1: Types of community conservation in sub-Saharan Africa

	Protected area outreach	**Collaborative resource management**	**Community-based resource management**
Objective	Biodiversity conservation	Conservation with some rural livelihood approach	Sustainable rural livelihood
Biodiversity resources	Vulnerable	Reasonably robust	Robust
Ownership / tenure status	State owned land and resources (e.g. national parks, forest and game reserves)	State owned land with collaborative management of certain resources with the community; complex tenure and ownership arrangements	Local resource users own land – either de facto or de jure; state keeps some control of last resort
Management characteristics	State determines all decisions about resource management	Agreements between state and user groups about manage-ment of some of the resources that are state owned; critical management arrangements	Conservation as an element of land use; emphasis on developing the rural economy
Policy instruments	Revenue-sharing (participation as means)	Collaborative resource use agreements (participation partly means, partly goal)	Community-based resource management (participation as goal)
Actors	Researchers	Farmers	Tourism, rural development initiatives

Source: Barrow and Murphree. 2001; Vedeld 2002

To begin with, protected area outreach can be understood as a form of community conservation that ascribes some rights to local communities, ideally resulting in benefits, while the state retains legal ownership of the protected land. Main priority is biodiversity conservation and the involvement of local people is merely seen as a means to reach biodiversity conservation goals (Barrow and Murphree 2001).

Next, collaborative management "describes situations in which 'some' or all the relevant stakeholders in a protected area are involved in a substantial way in management activities" (Borrini-Feyerabend 1996: 12). It involves the negotiation of an arrangement, whereby a parish, village or a specific group of resource users and a conservation authority agree to jointly manage a resource or an area that has conservation value (Barrow and Murphree 2001). However, legal ownership of the protected area remains with the governmental or private conservation authority, and conservation objectives remain the driving force for collaborative management, although livelihood objectives are also considered important. This is the form of community conservation that prevails around MENP. It will be discussed in more detail in the next section.

Lastly, community-based conservation shall be defined. It has the sustainable use of wild land and wildlife by the rural population as its main objective, whereby tenure rights are often found to be on the side of the local communities. It is not the park-people conflict that drives cooperation between the main stakeholders, but the joint desire to incorporate floral and faunal resources into the livelihood and development strategies of local people (Barrow and Murphree 2001). Three main elements distinguish community-based conservation from the other two types of conservation. The first is the focus on economic incentives, "the assumption being that rural people will not sustainably manage wildlife or wild land unless these are perceived to yield greater returns than other forms of land use such as crop growing or cattle rearing" (Barrow and Murphree 2001: 34). Second, devolution of authority and the equal distribution of rights and responsibilities are more pronounced than is the case for protected area outreach and collaborative management. And lastly, more emphasis is put on the development of communal institutions and local structures that effectively enable the management of natural resources.

2.5.1 Collaborative resource management in Uganda

Collaborative management as one of the three main community conservation approaches prevailing in sub-Saharan Africa dominates conservation efforts around MENP. It includes

instruments such as CRMAs, boundary management and sharing of revenues stemming from tourism activities, which will be briefly discussed in the following.

2.5.1.1 Collaborative resource management agreements

Every community directly bordering MENP's boundary has the right to negotiate a resource use agreement with the Ugandan Wildlife Authority. In the 'Mount Elgon National Park General Management Plan 2009-2019' it is written accordingly that regulated "harvesting of biophysical resources in a sustainable manner by community residents is allowed in agreed resource-use areas but only through negotiated collaborative management agreements" (UWA 2009: 44). These contracts are agreed upon between the resource users of a particular parish, represented by the chairman of an elected resource use committee on the one hand, and the Ugandan Wildlife Authority, represented by the chief warden of MENP, on the other hand. The duration of an agreement may range from three years (formerly two years) to a few months only. In an exemplary CRMA issued for Mutushet parish it says that the "agreement will be revised every 2 years, or earlier if necessary by mutual agreement of the parties" (UWA 2003). Yet, in the Noragric working paper 'To Co-operate or Not to Co-operate?' it says that the Ugandan Wildlife Authority "at any time can withdraw from the agreement, revealing substantial underlying asymmetric power relations" (Sletten et al. 2008: 45).

The collection of the agreed upon resources then is restricted to one or two days per week, as are the amounts that resource users are allowed to collect, usually to one head load or bundle per household. The number of types of resources permitted to be collected can range from one (specific issue access) to as many as 13 different types (integrated resource access) and thus may affect livelihoods to varying degrees. CRMAs also specify the trails that are to be used for forest product extraction and the particular zones in which extraction shall take place. The access of cultural sites located inside the national park is another activity regulated by CRMAs, as well as how contract breaches by either of the parties are to be handled.

Geographical concentration of resource use agreements to three out of eight districts bordering MENP implies that the process of selecting sites for CRMAs is a highly political one. Earlier interviews with MENP staff revealed that 'poor' relations were cited as the reason as to why agreements were not (re-)negotiated in other districts (Cavanagh 2009), a notion that will be confirmed in the course of this work.

2.5.1.2 Boundary management agreements

Next to collaborative resource management agreements, boundary management prevails around MENP and aims at actively engaging park neighbors in conservation efforts. According to a park executive, the marking of the park boundary with concrete pillars is insufficient for protecting MENP from encroachment. Therefore, Eucalyptus trees are planted as live boundary markers within a 10 meter strip of park land, which is aimed at enhancing recognition of the boundary and containing increasing demand for pole wood from the park.[4] For the ground preparation and planting of the trees, the Ugandan Wildlife Authority pays local community members and also covers the costs for seedlings, transportation and supervision of the planting progress.

After the planting stage is completed, communities are allowed to cultivate low shade crops such as cabbage, onions or beans within the established boundary strip, but only until the canopy layer is closed (UWA, internal document). Cultivation, being strictly limited to areas that have been planted with Eucalyptus, is then regulated by one-year renewable permits. However, no specific information is available about the selection process of beneficiaries by the park authority. In the internal MENP document it is merely written that the "most responsible and faithful farmers at parish level [that] are later mobilized to form a boundary management committee" are charged with the task to ensure survival and maturation of the boundary trees after farmers have stopped cultivating in the buffer zone. Because that is when communities are allowed to access mature trees according to the terms spelt out in the boundary management agreement. The whole process is guided by park staff, i.e. by community conservation rangers to ensure adherence to the set guidelines (ibid).

As a matter of fact, all communities currently benefiting from CRMAs, except for those with a specific issue access agreement, benefit from boundary management as well.

2.5.1.3 Other collaborative management instruments

Lastly, communities living adjacent to MENP may also benefit from the park's revenue sharing scheme, established in order to compensate for the losses of environmental income, and to prevent locals from encroaching on the park. According to MENP's general management plan (2009), 20% of the park's entrance fees are reserved for community projects that to some extent need to deal with the topic of nature conservation. Projects currently supported encompass beekeeping, dairy farming and service provision for tourists, and aim at providing alternative incomes to local communities.

[4] Source: internal document by the Ugandan Wildlife Authority, received 29th March 2011

For the year 2011, the Ugandan Wildlife Authority said to have funds of approximately 40 million UgShs at its disposal, an amount that is equivalent to a little more than US-$17,000. Just within the first two months of the year they had received 20 applications asking for revenue sharing funds which, if all applications got approved, would leave every project with a meager amount of US-$ 850. Cavanagh questioned accordingly "whether the park actually generates enough 'multiplier effects' to even compensate communities for the economic costs associated with the conservation of the mountain as a protected area, let alone actual livelihood improvements" (Cavanagh 2011: 24).

Furthermore, field research conducted for the purpose of this work, but also by Cavanagh (2009), revealed that it is communities benefiting from CRMAs and BMAs that are again more likely to benefit from revenue sharing projects. This was explained by the park management with the fact that communities with CRMAs and BMAs already have well-established collaborations and communication structures with the park staff. That is to say that one particular parish may benefit from a resource use agreement, a boundary management agreement and a revenue sharing project, while another parish may not benefit from any of those schemes.

According to MENP staff, the collection of firewood is tolerated all around the park, irrespective of any agreement. The rules that apply for the extraction of firewood are similar to those specified in CRMAs, i.e. firewood collection is allowed for two days per week, and limited to one head load per household per day. Yet, the absence of a written agreement introduces a considerable power imbalance between park staff and park neighbors, as well as severe legal uncertainty. Moreover, doubt prevails among community members of non-agreement areas whether other resources are allowed to be harvested. This is because some people experienced serious punishment after collecting forest products other than firewood in the past, while others reported to be able to collect them on a regular basis without problems.

3. Study site

"The colonial legacy has created a protectionist perception in which resource users are problem makers."[5]

This chapter aims at presenting the study area with regard to its climate and topography, its fauna and flora, as well as its people; and at describing the area's conservation history and current management structures.

3.1 Mount Elgon

Mount Elgon is an extinct shield volcano on the border between Uganda and Kenya. With its highest point on the crater rim at 4321 meters above sea level, it is the eighth highest massif in Africa and the second highest in Uganda, after the Rwenzori. The Mount Elgon massif consists of five major peaks, most of them being situated within the Ugandan part of the volcano. With a north-south extension of about 80 km and an east-west extension of 50 km, it is the largest solitary volcano in East Africa with a size of about 3,500 km^2. The protected area of Mount Elgon covers about 2,045 km^2, with 1,145 km^2 comprising MENP on the Ugandan side of the volcano (Scott 1998).

3.2 Geography

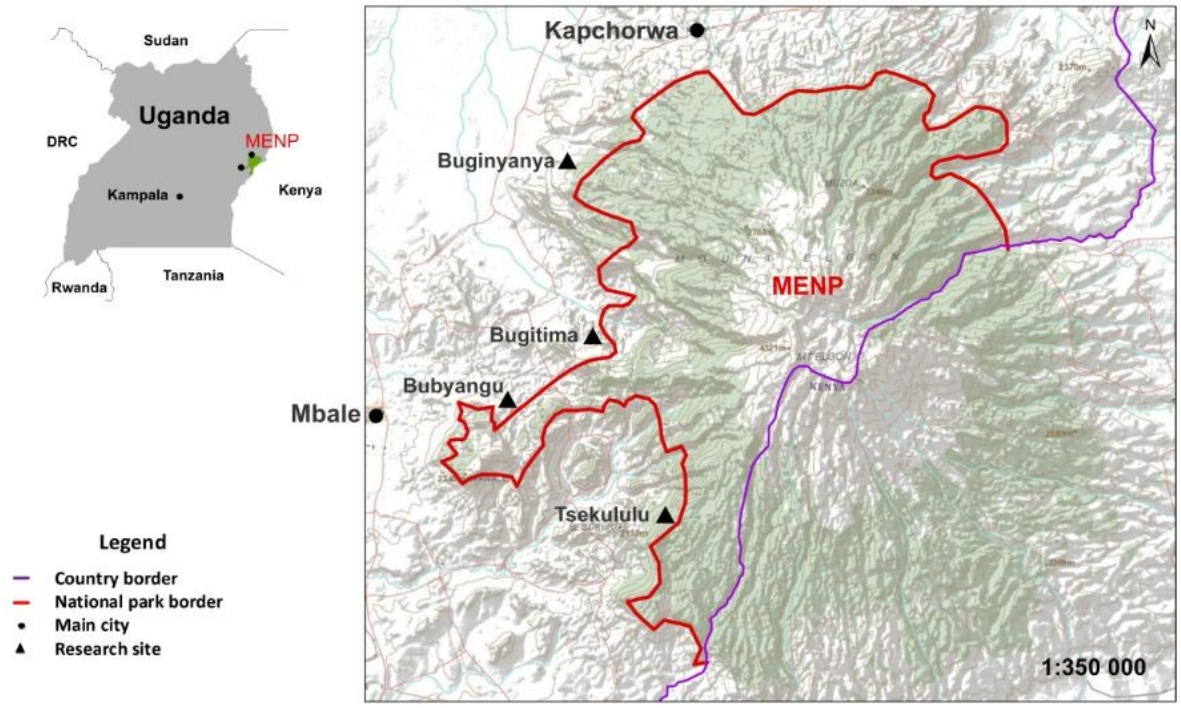
Forests provide a range of services in general, and to the people living in its direct neighborhood in particular, few of which are priced in the market (Perrings 2000). One of the most important services of the Mount Elgon forest is the stabilization of the local climate – rainfall in MENP ranges from 1500-2500mm per year, making it a rainfall-abundant area, well-suited for agricultural activities. Although it rains all year around, the months of July and August, as well as December, January and February are relatively dry.

As the oldest of the Rift Valley volcanoes, Mount Elgon has been exposed to massive erosion over a long period of time, which "created a landscape with very gentle, long slopes" (Scott 1998: 9). One of the special features is the 20-km-long Nkokonjeru arm, also known as Wanale ridge, branching off to the west. Furthermore, one can find one of the world's largest

[5] Source: HURINET-U (2010: 7)

calderas on Mount Elgon, with a diameter of about 8 km. The caldera is a flat-bottomed depression on the top of the mountain, surrounded by a virtually intact rim of scattered cliffs (Scott 1998), and it is there that one can find most of the peaks.

As a shield volcano, i.e. a volcano which has developed almost entirely from fluid lava flows, Mount Elgon's soils are primarily volcanic, and thus rich in calcium, sodium and potassium. Under natural conditions, this soil and the high annual precipitation support a varied tropical forest. When cleared of forest cover, Mount Elgon's soil that consists of brown to red clay-loams is very fertile, and hence highly suitable for agricultural activities up to an altitude of about 3,000 meters. Above that level, shallow black humus soils prevail.



Source: ESRI ArcMap Basemap; Google Open Street Map; edited by Ricarda Moll, Tatjana Bodmer (2011)

Figure 3: Location of the four research sites around Mount Elgon National Park

3.3 Fauna and flora

As opposed to some of Uganda's other national parks, such as Bwindi Impenetrable National Park or Queen Elizabeth National Park, large mammals can rarely be spotted in MENP. It is however highly endowed with smaller mammals, birds and butterflies. About 30 species of small mammals, such as rodents and shrews; 300 different bird species and more than 150 types of butterflies are found to be at home in MENP (Katto 2004; UWA 2009). It is rather

for its scenic landscape with all the hot springs, waterfalls and caves that tourists choose to visit Mount Elgon National Park.

Mount Elgon's vegetation reflects the altitudinal zonation in the forest belt that is commonly associated with large massifs (Katto 2004). It can be divided into four broad vegetation groups, which are (1) mixed montane forest, (2) bamboo and low canopy montane forest, (3) high montane heath and (4) moorland.

3.4 Ethnicity

There are two major tribes living in the Mount Elgon region – the Bagisu (Bamasaba) and Sebei (Sabiny). Bagisu mainly settle on the southern and western sides of the volcano, whereas the Sebei are the dominant ethnic group on the northern side of Mount Elgon. The Bagisu are said to have moved to Mount Elgon around 1,500 AD, much earlier than the Sebei. They are a Bantu tribe and mainly engage in agriculture, which is why they are heavily dependent on MENP land and other resources for the sustenance of their livelihoods (Norgrove and Hulme 2006).

The Sebei, a Nilo-Hamitic tribe, are closely related to the Kalenjin of western Kenya and were originally pastoralists. Due to rising population density and "intensified cattle rustling in the plains, many Sebei have migrated up the mountain slopes, reducing their livestock numbers and adopting domestic agriculture in addition to commercial cultivation of maize and wheat" (Katto 2004: 38). Yet, the maintenance of still relatively large numbers of cattle denotes above all the need for expansive grazing areas, leading the Sebei to graze their cattle inside the park boundaries (Cavanagh 2011).

3.5 Regional organization and political structure

As of 2010, Uganda is subdivided into 111 districts, of which eight are located around MENP. These are from south to north Manafwa, Bududa, Mbale, Sironko, Bulambuli, Kween, Kapchorw and Bukwo. Districts, in turn, are subdivided into counties, while counties consist of sub-counties. Those are then subdivided in parishes that are the second smallest geographical unit before villages.

The political structure parallels the system of geographical organization. At the local level, government bodies are known as 'local councils' (LC), and are organized in the following manner:

- Village Council (LC I)
- Parish Council (LC II)
- Sub-county Council (LC III)
- County Council (LC IV)
- District Council (LC V)

3.6 Mount Elgon's conservation history

Mount Elgon National Park is one of ten national parks in Uganda and its conservation history goes far back into the beginning of the 1930s, to a time where Uganda was still British protectorate. Around 1940 the Mount Elgon forest was gazetted as 'Crown Forest', while some years later its status was changed into 'Central Forest Reserve', thus being declared a forest of regional significance under the management of the central government (Norgrove 2003). During those years and further on until 1993 the forest was managed by the Uganda Forest Department, mainly for "its water catchment values and for limited exploitation of its timber resources" (UWA 2009: 20). Initially, rights of local people to use forest resources were not clearly defined, resulting in a situation where most forestry officials allowed subsistence utilization of the forest by neighboring communities (Norgrove 2003).

Later on Idi Amin, president and military leader of Uganda during the years of 1971 to 1979, actively encouraged the clearing of forests in order to increase access to arable land and "to destroy rebel hiding places" (Norgrove 2003: 116). This, the breakdown of the country's governance under the chaos of civil war, and the increasing international demand for products such as ivory and exotic timber, had devastating impacts on the fauna and flora of the Mount Elgon forest reserve. In Norgrove and Hulme it says summarizing, "[r]eserve neighbours expanded their agriculture and grazing into the forest and up the slopes while senior forestry officers issued licenses for residence, grazing and cultivation within the reserve in return for bribes. By the time 'peace' returned to the country in the late 1980s some 24,000 hectares of protected area had been degraded and many people believed they had acquired 'rights' to the reserve by use and/or licensing arrangements" (Norgrove and Hulme 2006: 1098).

As a response to internal pressure from the Ugandan government, and international pressure following the 1992 Earth Summit in Rio, the status of the Mount Elgon forest reserve

was upgraded to national park in 1993. This change in legal status had dramatic consequences for the livelihoods of tens of thousands of people living adjacent to the newly created MENP, which becomes clear by looking at IUCN's definition of a national park. According to their categorization of protected areas, a national park's primary objective is "[t]o protect natural biodiversity along with its underlying ecological structure and supporting environmental processes, and to promote education and recreation"[6]. In practice this meant that settlements and cultivated land situated within the border of the newly created park were no longer legally accessible for local people. Those trying to keep accessing 'their' land were rejected to enter the park, and if considered necessary, forcefully evicted. Yet, land "is a primary and fundamental but also highly symbolic resource for the vast majority of African peoples, representing a key building block for so-called traditionalist societies and economics." (Alden and Anseeuw 2010: 2) That is why severe (armed) conflicts between park staff and park neighbors developed as a result of the preservationist conservation approach chosen by the Ugandan government. Moreover, the majority of the people affected by expropriation and eviction had not experienced any appropriate form of compensation.

To sum up, during the first years following the creation of MENP, the government focused on establishing a recreation and tourism reputation for the park. Biodiversity conservation efforts paired with scientific research, and other approved economic activities were supported (Norgrove and Hulme 2006) rather than the limiting of adverse effects accruing to the park's neighbors. However, this changed approximately by 1996, the time when Uganda National Parks and the Game Department merged to become the Ugandan Wildlife Authority. In Scott's work 'From Conflict to Collaboration' it is written that as "part of the merger process between Uganda National Parks and the Game Department, revised legal and policy documents have been prepared, incorporating a stronger policy to address the needs of populations living adjacent to the country's national parks and game reserves" (Scott 1998: 7). It was in the course of this development that the national park was divided into six management zones in order to better regulate activities conducted in the forest. The names of the different zones indicate clearly what types of activities are allowed in the respective zones: preservation zone, integrated conservation zone, tourism zone, intensive use zone, restoration zone, and boundary zone.

More on the management of MENP follows in the next and last section of this chapter.

[6] Source: http://www.iucn.org/about/work/programmes/pa/pa_products/wcpa_categories/pa_categoryii/

3.7 The management of MENP

The Ugandan Wildlife Authority, a statutory body under the supervision of the Minister for Tourism, Trade and Industry, was established through the 1996 'Uganda Wildlife Act' and became operational in August of the same year. Its main responsibility is the management and administration of Uganda's ten national parks plus a number of other protected areas.

MENP's regional headquarter is situated in Mbale town and comprised of 7 operational divisions – accounts, community conservation, law enforcement, monitoring and research, plantation, restoration and tourism. Next to the operational unit responsible for managing community conservation, the division for law enforcement, a unit with paramilitary features defending the park against encroachment, is involved in resolving the conflict between park neighbors and park staff. Optimally, at each of the outposts situated around the park, of which there are 18 at the moment[7], at least one ranger should be part of the community conservation unit, as it is those rangers that are trained in conflict management, as opposed to the law enforcement rangers that rotate from outpost to outpost every 3 months, so as to not develop to close relationships with the locals. Also, community conservation rangers are "assigned responsibility for leading field teams to develop collaborative management agreements within their range" (UWA 2009). However, interviews with community conservation assistant warden Godfrey R. Matanda and community conservation ranger Vincent Kuloba revealed that there are currently only four community conservation rangers available for managing all of MENP. And as was learned, those rangers are stationed where agreements exist, and not where conflicts prevail and the need for mediating actions between park neighbors and park staff is highest.

As insinuated earlier, towards the end of the 1990s and during the early 2000s, almost all parishes bordering MENP had active CRMAs. When asked for the reason why today almost three quarters of those parishes do not have agreements anymore, G.R. Matanda answered that in the park authority's eyes communities whose agreements were terminated, are perceived as 'too demanding'. That means that in practice those parishes having a good relationship with the park authority are preferred in the process of (re-)negotiating CRMAs as opposed to parishes with a more complicated conservation background. Thus, it will be of interest to find out in which ways communities targeted by the wildlife authority differ from each other and whether this targeting strategy has an impact on the effectiveness of CRMAs?

[7] Source: internal document (map) by the Ugandan Wildlife Authority, received 9th September 2011

4. Methodology

"There are three methods to gaining wisdom. The first is reflection, which is the highest. The second is limitation, which is the easiest. The third is experience, which is the bitterest."[8]

This chapter contains information about the methodology that was used for the data sampling and collection, an overview of the different variables created, and information on statistical tools that were employed in the data analysis. The last section deals with the limitations of this thesis.

4.1 Sampling Strategy

The data analyzed in this thesis was collected during January and February 2011 in several villages situated in four different sub-counties, whereby each of the sub-counties is located in a different district bordering MENP.

The sampling strategy combined probability and non-probability methods. Non-probability purposive sampling was used to identify the four study sites. By the time the study was planned and conducted there were only 16 parishes having an active agreement with the Ugandan Wildlife Authority. Of those 16 parishes, eight were situated outside the area including the target population, which consists of all rural households living in Bagisu communities directly bordering MENP. Finally, two study sites (Bugitima and Buginyanya) with active resource use agreements were chosen due to characteristics such as easy accessibility by vehicle and the duration of the established agreement, which was preferred to be similar for both of the sites.

Then the other two sites (Bubyangu and Tsekululu), i.e. those not having a resource use agreement, were chosen similarly, saying that parishes without agreements bordering the national park were identified and assessed according to duration of non-agreement period, accessibility by vehicle and whether they were situated in different districts in order to introduce some variability.

The target population was limited to Bagisu communities only, and not to all the ethnic groups living around MENP, in order to avoid sampling error. Since it was expected

[8] Confucius (BC 551-BC 479)

that the sample size would be rather small, due to time and budget constraints, the aim was not to introduce another independent variable, as it is commonly known that "sampling error is more likely to be a problem in small samples drawn from heterogeneous populations" (Angelsen et al. 2011: 54).

Within the different parishes, households were chosen using systematic random sampling. Thereby a household in this study is "conceived as the social group which resides in the same place, shares the same meals, and makes joint or coordinated decisions over resource allocation and income pooling" (Ellis 2000: 18). As for the sample frame at village level, no lists of names or households were available. Conducting a complete enumeration of the survey area prior to conducting the survey was not possible either, due to practical (very remote houses) and time limitations. Hence, relevant villages bordering the park in each of the 4 areas were identified with the help of contact persons, mostly local chairpersons, during the reconnaissance visits that preceded the actual interviews.

As mentioned above, the household sampling then followed a systematic random sampling strategy where only every third household on a predetermined route through the village was visited for interviews. This was practical but also necessary due to a number of reasons. Firstly, related family members often lived in houses directly neighboring each other. Secondly, even though village sizes were small, it was difficult to get a full overview of all existing households in the villages due to the remoteness of some of the households, prohibiting simple random sampling.

In that way 20 households were selected for interviews in each of the four study sites, giving a total sample of 80 individual observations, and comprising an overall population of 498 people.

4.2 Data Collection

The collection of quantitative and qualitative data was conducted during January and February 2011. A Ugandan research assistant speaking Lugisu, the language of the Bagisu, translated the questions and answers during the three different types of interviews: (i) household interviews, (ii) key informant interviews, and (iii) focus group discussions. Furthermore, detailed observations helped to triangulate, assess and sort the quantitative information obtained during the interviews.

4.2.1 Household Interviews

Household interviews were conducted using a semi-structured questionnaire (see Appendix 1) in order to obtain both primary quantitative and qualitative information on the local poor's livelihoods, as well as on household specific characteristics. Interviews were mainly conducted in the respondents' houses, except for some interviews conducted in Bugitima sub-county that took place alongside the road during market day. Purpose and procedure of the interview were explained to the respondents prior to the interview and only after their agreement the questioning commenced. Interviewees cooperated in all but one case, where the respondent was reluctant to answer the questions of the survey. In this case the interview was conducted with the co-wife of the same household head instead.

Testing the survey prior to the first interview helped in making final adjustments and training the research assistant.

4.2.2 Key informant interviews

Key informant interviews were conducted in order to gain insights into local contextual variables, policies, and historic developments concerning MENP. Key informants included chairpersons, mainly from local councils on village, parish and sub-county level; chairpersons of the different resource use and boundary management committees, and Ugandan Wildlife Authority staff, interviewed both at the MENP headquarter and in the field.

4.2.3 Focus group discussions

Focus group discussions with approximately 20 randomly chosen participants were conducted in each of the four study sites. Using an open questionnaire allowed for a guided discussion which aimed at identifying major livelihood strategies, the role of the forest for the community, and problems encountered in farm, off- and non-farm activities and forest product collection due to the vicinity to the park.

4.3 Data Analysis

Data analysis and management were conducted using STATA. The quantitative data from the household interviews were statistically analyzed by running different types of significance tests, simple and partial correlations, as well as simple and multiple linear regressions.

4.4 Definition of Variables

This part aims at explaining how variables were created and to introduce the most important ones of them. In total, more than 200 variables were entered in STATA. Many of them were simply entered the way they were asked in the questionnaire, whereas others needed additional definition and calculation, as will be illustrated in the following sections.

4.4.1 Simple Variables

Simple variables were directly derived from the questionnaire and comprise for example of the household head's age, sex and education level, the number of family members, the spouse's level of education, the size of the farmland, the tenure status, whether a household head was born in a village or immigrated there, as well as of all dummy variables.

4.4.2 Composite Variables

In order to make useful comparisons between households, adult equivalents were calculated, given the size and age composition of each household. For calculation of adult equivalent units (AEUs) the scale commonly applied by the World Health Organization was used and is shown in Table 2:

Table 2: Adult equivalence scale

Age	Male	Both	Female
0-2		0.40	
3-4		0.48	
5-6		0.56	
7-8		0.64	
9-10		0.76	
11-12	0.80		0.88
13-14	1.00		1.00
15-18	1.20		1.00
19-59	1.00		0.88
60+	0.88		0.72

Source: World Health Organization, quoted/used in Campbell and Luckert (2002)

4.4.2.1 Income

The main purpose of a livelihood questionnaire is to calculate rural income. According to Angelsen et al. "rural household income includes three broad components:

- Value added from self-employment, for example, agriculture, forestry or other business.
- Wage earnings and rents from renting out land or other forms of capital.
- Transfers, for example, remittances and pensions." (Angelsen et al. 2011: 111)

Income from self-employment can be described by the following equation:

$$I = \sum_{i=1}^{n} p_i y_i - \sum_{j=1}^{m} q_i v_i ,$$

that is total income (I) is the "gross value (price times quantities of all *n* products) minus total costs (price times quantities of all *m* purchased inputs), for example, fertilizers, seeds, tools, hired labour" (Angelsen et al. 2011: 113).

(i) Farm income

Total income from crop cultivation was obtained by summing up the values of all crops cultivated and harvested by the household, using either prices given by the respondents or market prices otherwise, and then deducting the total value of inputs used for their cultivation. Net crop cash income was obtained in a similar way, i.e. by aggregating the value of the harvest that was sold and deducting the value of inputs that could be associated directly with the production of crops intended for sale. The net subsistence income from crop cultivation

was obtained by aggregating the value of crops consumed at home and deducting all other costs, i.e. the value of inputs that could not be directly assigned to the production of crops intended for sale. Inputs included expenses for seeds, fertilizers and pesticides, external labor, and other inputs, such as for hiring machines.

Total income from livestock was obtained in a similar way to total crop income. For the net cash income from livestock no costs were deducted, because in none of the cases livestock products were intended for sale only. Thus, costs were deducted entirely from subsistence income. The different types of inputs included costs for medical treatment, fodder (either grown, bought or collected in the forest), and other costs such as for ropes, stalls etc.

Finally, farm income "includes livestock as well as crop income, and comprises both consumption-in-kind of own-farm output as well as the cash income obtained from output sold" (Ellis 2000: 11).

Changes in the value of crop land or livestock were excluded from income calculations. Angelsen et al. confirm the notion that the inclusion of changes in the value of assets in the income definition can become quite complicated. Hence, it is preferred to look at both the income and asset dimension in order to gain a holistic impression on a household's livelihood situation (Angelsen et al. 2011). The calculation of household wealth caters for this.

(ii) Forest environmental income

To be able to explain how environmental income has been calculated it appears necessary to carefully define this variable, especially because the concept of environmental income is, compared to the other forms of income presented here, a more contested and less well understood one. According to Sjaastad et al. (2005), there are four different income measures that are, implicitly or explicitly, applied in the measurement of resource values and environmental income. Those measures are (i) the gross income, (ii) the value added, (iii) the profit, and (vi) the rent earned from the collection of environmental resources. The following figure shows how the different measures are defined and interrelated:

<table>
<tr><td colspan="4">Gross income</td></tr>
<tr><td rowspan="3">Capital consumption</td><td rowspan="3">Costs of intermediate inputs</td><td colspan="3">Value added</td></tr>
<tr><td rowspan="2">Labor costs</td><td colspan="2">Total profit</td></tr>
<tr><td>Normal profit</td><td>Rent</td></tr>
</table>

Source: Sjaastad et al. (2005: 40)

Figure 4: The relationship between different concepts of environmental income.

The measure relevant for this work is that of value added, which is the gross value of environmental resources minus the costs of capital consumption and intermediate inputs. By using this definition, costs related to family or wage labor are not taken into account. This is mainly due to practical reasons, considering that the opportunity cost of labor and capital is difficult to determine. However, "an additional argument for using value added is the fact that it is in line with normal concepts of income used elsewhere and thus provides a basis for direct comparisons" (Vedeld et al. 2004: 7). Hence, the definition of (forest) environmental income as it is used in this paper becomes: "Environmental income is the capture of value added in exchange or consumption of natural capital within the first link in a market chain, starting from the point at which the natural capital is extracted or appropriated" (Vedeld et al. 2004: 7).

Forest environmental income can be usually distinguished into park and non-park environmental income. In this work, however, the differentiation was found to be of minor importance for the analysis. The only environmental resource mentioned to be collected outside the park was fodder, but only in some few cases. The majority of the households grew fodder on their own land, collected it in the park, or simply bought it. Additionally, some people collected dry Banana leaves and small twigs and branches outside the park to supplement their firewood. But it was found too difficult to value these resources, as no prices exist for them, collection happened only very irregularly and amounts were usually small.

Thus, in the following the focus will be on park environmental income. Main contributor to this income is firewood. Average prices per bundle, differing from region to region, were used for calculating the value of firewood collected by households. The same holds true for the valuation of the other resources that were collected. For the computation of environmental cash income, prices given by the respondents themselves were used for the valuation as this was considered more accurate than using averaged or market prices.

A couple of products have not been accounted for in the calculation of environmental income. These include for example water, and illegally extracted resources. The former has been 'ignored' because there simply is no market price for water, as it is abundantly and freely available. Because it usually is a very sensitive topic to talk about, resources extracted illegally from the park were not asked after explicitly. It is therefore very likely that some of the environmental income calculated includes income that was illegally obtained or that income was calculated lower than it really was.

(iii) Off- and non-farm income

For the purpose of this thesis, off-farm income is considered income earned from farming activities exercised on other people's land or from herding other people's cattle. By contrast, non-farm income is income derived from employment or self-employment that is not directly related to farm activities, such as teaching, running a shop, being employed by a public institution or NGO, riding a motorcycle or bicycle taxi, and so forth.

Yet, both types of income were combined in one measure. It is simply displaying the value mentioned by the respondents, and exclusively treated as cash income.

(iv) Remittances

All other incomes received by the respondents not fitting into any of the above described categories were treated as remittances.

Finally, summing up all the different incomes gives the total household net income, earned during the past twelve months. Dividing the total household net income by the households corresponding adult equivalent unit gives total income per adult equivalent (or per capita).

4.4.2.2 Wealth

The wealth calculation included the summation of all the assets owned by the respondents, i.e. personal belongings, land, machines and livestock. For evaluating the landholdings, average prices were used, for all the other assets exact prices given by the respondents themselves were considered. Yet, because of the long recall period of twelve months and the change in assets that has happened in this period, two wealth estimates were computed, one displaying the value of a household's possessions at the time the interview was conducted, and the other one displaying the value of a household's assets twelve months before the interview was conducted. Mostly because of practical reasons, both of the estimates were later combined in one average wealth estimate that was then used in the regression analyses.

Other measures calculated for the analysis are for example the Gini coefficient and the Foster-Greer-Thorbecke class of measures that yield the headcount index and the two poverty gap indices. These measures will be introduced and explained in the analysis directly, so as to contribute to a better understanding of the topic that they are relevant for.

As for the poverty groups 'poor', 'medium poor' and 'less poor', stratification was done by first ranking and then dividing the total sample into three groups of approximately same size according to their annual per capita net income.

4.5 Representativity, validity and reliability

Representativity is difficult to assess, but it should be noted that this work is mainly a case study with results not being easily conferred to other park populations.

Threats to validity, a concept dealing with systematic errors, may have been introduced due to the small sample size, sample selection bias, systematic measurement errors, or misspecifications of the regression analyses. Also, simultaneous causality running from study site to CRMA and vice versa may threaten validity. But an investigation of the targeting strategy of the Ugandan Wildlife Authority was included in order to circumvent this problem.

Threats to reliability, a concept dealing with random errors, may have been introduced when questions were answered though not fully understood by some of the respondents, when data was incorrectly transferred from paper to computer, or study sites were chosen that were heavily affected by rain and landslides during the recall period. Triangulation of the information obtained during fieldwork was aimed at throughout, and has certainly contributed to increased validity and reliability of the results that are going to be presented in the following.

5. Results and discussion

"Peasant populations occupy the margins of the modern world economy. With one foot in the market and the other in subsistence they are neither fully integrated into that economy nor wholly insulated from its pressures."[9]

In this chapter results of the data analysis are presented and discussed. It starts with a presentation of the socio-economic characteristics of the total sample and the sub-samples respectively, followed by the sample's asset endowments, as well as the predominating livelihood strategies. Afterwards income and wealth estimates are presented, followed by detailed analyses of the three main livelihood outcomes: diversification of livelihoods, dependence on environmental income, and income distribution and poverty around MENP.

5.1 Basic household statistics and livelihood strategies

First, household characteristics, including asset endowments, of the total sample are presented using descriptive statistics tools. It will also be examined how characteristics and access to assets vary across study sites, participation areas as well as income groups. Then access to assets will be further assessed according to their contribution to the specific livelihood activities pursued in the sample area.

5.1.1 Basic household characteristics

From Table 3 it can be seen that considerable differences in many of the variables prevail across study site and participation areas, of which a few appear to be significant on a 5%- to 1%- significance level. Those variables are the household head's level of education, the size of the household's self-owned arable land, and the distance to the nearest park entrance. All of them have been identified to be indicators of wealth among rural households situated around MENP, both in theory and practice.

Yet, variables prevailing non-significant differences deserve attention as well, as it is usually difficult to prove significance at a sample sizes as small as 80 observations.

[9] Source: Ellis (1993: 3)

Table 3: Socio-demographic characteristics by study site location and by participation in CRMA around Mount Elgon National Park

Variable	Unit	Sample mean	Bubyangu	Tsekululu	Bugitima	Buginyanya	Sig.	CRMA=1	CRMA=0	Sig.
Male headed HHs	Count (%)	75 (93.75)	19 (95)	20 (100)	18 (90)	18 (90)		36 (90)	39 (97.5)	
HH head's age	Years	46.98 (1.86)	47.85 (3.67)	51.95 (4.17)	41.5 (3.28)	46.6 (3.6)		44.05 (2.44)	49.9 (2.76)	
HH head's education	Years (n=79)	4.84 (0.42)	3.21 (0.98)	4.65 (0.74)	4.6 (0.57)	6.8 (0.89)	**	5.7 (0.55)	3.95 (0.61)	**
Spouse's education	Years (n=69)	4.15 (0.38)	4.88 (0.75)	3.63 (0.6)	4.63 (1)	3.53 (0.75)		4.06 (0.62)	4.22 (0.48)	
HH size	AEU	5.03 (0.27)	5.38 (0.57)	5.48 (0.67)	4.51 (0.43)	4.76 (0.5)		4.64 (0.33)	5.43 (0.44)	
CWR	Ratio	2.05 (0.09)	2.18 (0.19)	1.89 (0.17)	2.28 (0.25)	1.86 (0.12)		2.07 (0.14)	2.04 (0.13)	
Own land	Hectare (n=75)	0.58 (0.06)	0.52 (0.12)	0.29 (0.08)	0.91 (0.15)	0.64 (0.11)	***	0.77 (0.1)	0.40 (0.07)	***
Own land /AEU	Hectare/AEU (n=75)	0.13 (0.02)	0.11 (0.04)	0.06 (0.01)	0.21 (0.04)	0.16 (0.03)	***	0.18 (0.02)	0.08 (0.02)	***
Plots	Count (n=75)	2.80 (0.24)	2 (0.28)	1.95 (0.32)	3.6 (0.5)	3.6 (0.6)	***	3.61 (0.39)	1.97 (0.21)	***
Livestock	TLU (n=72)	1.34 (0.12)	1.1 (0.24)	1.42 (0.29)	1.21 (0.2)	1.63 (0.26)		1.42 (0.16)	1.26 (0.19)	
HH asset value	UgShs (mill.)	4.56 (0.50)	2.56 (0.66)	2.74 (0.6)	4.63 (0.75)	8.30 (1.3)	***	6.47 (0.8)	2.65 (0.45)	***
HH head is immigrant	Count (%)	20 (25)	4 (20)	3 (15)	6 (30)	7 (35)		13 (32.5)	7 (17.5)	
Poverty status	Count (%)									**
	Poor	27 (33.75)	8 (40)	9 (45)	4 (20)	6 (30)		10 (25)	17 (42.5)	
	Medium	27 (33.75)	7 (35)	8 (40)	6 (30)	6 (30)		12 (30)	15 (37.5)	
	Less poor	26 (32.5)	5 (25)	3 (15)	10 (50)	8 (40)		18 (45)	8 (20)	
Distance to park	Meter	1433.25 (152.7)	1067 (195.8)	1070.5 (149.7)	2330.5 (492.1)	1265 (163.6)		1797.75 (269.8)	1068.75 (121.7)	**
	Minutes	23.19 (2.04)	21.7 (2.78)	15.3 (2.8)	36.4 (5.7)	19.35 (2.8)	**	27.875 (3.42)	18.5 (2.02)	**

*n=80, if not indicated otherwise; * indicates significant differences across categories: *** = significant at P < 0.001, ** = significant at P < 0.05, * = significant at P < 0.1; for continuous variables means are given followed by the standard errors in parentheses; for categorical variables, percentages of respondents in each category of the variable are given; significance tests used for comparisons between categorical variables: chi^2, otherwise: t-test where differences across two categories, or Kruskall-Wallis where differences across more than two categories, were tested for*

Most striking about the sample's access to assets is that it is extremely low, even more so for communities not benefiting from CRMAs. This will become clear in the next paragraphs, where the most important assets will be analyzed one by one.

Arable land as part of natural capital is the main livelihood asset for rural households around MENP. An average household has access to arable land of about 0.6 hectares (ha). Households in parishes with agreements have bigger plots (0.77 ha) than household in areas without agreements (0.4 ha). Differences in the size of arable land are even bigger across study sites, with households in Bugitima sub-county possessing on average nearly three times as much land as households living in Tsekululu sub-county. It also increases significantly with income.

An average number of 1.34 livestock units is low, and exhibiting only small differences across households situated in agreement areas as compared to households from non-agreement areas. Some differences exist across study sites, as well as across income groups, but none of the differences in access to livestock are significant.

Access to the park's resources in terms of distance to the boundary varies considerably and is significant on a 5%-significance level across sub-samples. Households from Bugitima and Buginyanya sub-counties, i.e. those benefiting from CRMAs, need to walk on average 1.7 km or 29 minutes to reach the nearest park entrance, whereas the other households need to walk 1.1 km or 19 minutes only. In terms of income, it is the poorest that live closest to the park, followed by the medium poor and the richest, respectively.

Human capital endowments are mainly assessed in terms of education levels and household size. The average household head received less than 5 years of schooling, with household heads from parishes with agreements being again relatively better endowed. Across study sites, education levels vary considerably with values ranging from an average value of 3.2 years for Bubyangu sub-county to a value of double as much, i.e. 6.8 years, for Bugitima sub-county. There is a clear positive relationship between years of schooling and income. Similar patterns prevail for spouses' education levels.

Families have on average slightly more than six members, when measured in adult equivalent units (AEU) this number drops down to five, with larger families living in non-agreement parishes. In our sample, richer families are also bigger in terms of size, but their consumer-worker ratios are smaller, indicating that poorer families have more dependents to provide for.

Most of the households possessed none or only a few personal assets of value, such as radios or mobile phones. Merely in a small number of cases agricultural machines such as depulping equipment for processing coffee, or grinding mills for processing maize, were owned.

The average value of physical capital was almost 2.5 times higher in the agreement sample as compared to the non-agreement sample. This difference can be expected to be mainly due to the differences in the size of landholdings.

Also, the access to financial capital appeared to be very restricted - the majority of the people did neither have access to loans nor did they have the capacity to save some of their income for bad times. Some 10% of the households engaged in lending and/or saving groups, where however only small amounts of money were saved or borrowed. Official lending institutions were mentioned to be an option by three people only. Yet, unofficial lending from coffee or passion fruit traders that advance money to their regular clients was mentioned to be of importance for about 12.5% of all the households interviewed. None of the households in Bubyangu and Tsekululu sub-counties had access to formal loans, the impression arose that it was more difficult for them to borrow money than for households from parishes with resource management agreements. Half of those households characterized as rich had access to some form of loan, while in the other two income groups only two or three households were able to borrow money.

Lastly, social capital can be assumed to be rather poorly available in the parishes bordering MENP. However, no detailed investigations have been conducted in this respect.

To sum up, households not benefiting from CRMAs are situated closer to the park boundary, have relatively less educated household members and smaller landholdings to cultivate on, they also possess less physical assets. All of these differences are significant on a 5%- to 1%-significance level. Furthermore, families are larger and have older household heads on average in non-agreement areas.

This said, a first result can be noted, namely that households without CRMAs are likely to be more dependent on forest environmental income than households benefiting from agreements. Hence, there is reason to believe that the Ugandan Wildlife Authority chooses communities for signing CRMAs according to their conflict potential, which is supposed to be lower, the less dependent households are on environmental income.

5.1.2 Livelihood strategies

5.1.2.1 Farm activities

Subsistence farming, mainly in combination with animal husbandry, depends highly on the access to land, labor and livestock. Moreover access to physical and financial assets are necessary in the process of improving productivity and increasing disease resilience by investing in machines and pesticides. Social capital, e.g. in the form of a membership in a cooperative, is said to help farmers in marketing and selling their products.

Subsistence farming was mentioned to be the household's main occupation in 90% of the cases. Yet, the other 10% of the total sample engaged in some form of farm-related activities such as agricultural piece work, which will be further discussed in the section on off- and non-farm activities. As mentioned before, the average size of arable land in the sample is small, and varies significantly across study sites and participation groups. Due to significant correlation with land size, the average number of crops cultivated per household differs also significantly across study sites and participation groups. Thereby, households in Bubyangu sub-county grow on average 5.2 different crops, whereas those from Buginyanya grow approximately 7.8 different crops. Moreover, households growing a more diversified portfolio of crops than others were found to also cultivate more cash crops, confirming a positive relationship between the number of crops and the level of cash income.

Animal husbandry was mentioned to be part of the household's livelihood strategy in 90% of the cases, just as crop cultivation. Tropical livestock units did not differ very much across sub-samples, and the impact of livestock income to total income was not significant.

5.1.2.2 Resource collection

For rural households living adjacent to natural forests, the collection of forest products for income generation is of considerable importance, and 87.5 % of the households from the total sample confirmed this notion. Forest environmental income did not differ largely across participation groups or regions, indicating that it is of equal importance across regions, despite the differences in average income across sub-samples. The same holds for income groups, confirming the hypothesis that forest dependence does not vary significantly with economic wellbeing, at least in terms of absolute contributions to total income, as was hypothesized in the second chapter.

The main reasons for not collecting any resources from the forest were either the fear of being harassed by park rangers, or the long walking distance to the park, which was a particularly important reason for older respondents. Still, 55% of all the households that collected forest products did this during two days of the week, the maximally allowed number of days agreed upon with the Ugandan Wildlife Authority. Where CRMAs were in place, the number was 62.5%, whereas in areas without agreements only 47.5% mentioned to extract forest resources from the park twice a week. Some respondents admitted to have entered the forest more than twice a week, even up to daily, and it is likely that the estimated number of unreported cases was even higher than only 'a few'. 40% of all households from parishes without agreement reported not to have entered the park on a weekly basis. And again 47.5% of the households living in non-agreement parishes reported to have access to firewood through cutting their own Eucalyptus trees. By contrast, the corresponding number of households cutting Eucalyptus trees in parishes with CRMAs was 27.5% only.

The assessment of the relationship between the park staff and the different communities varies on average only slightly, with communities living in parishes with agreements characterizing it as slightly better than communities not living in these parishes. The difference in mean values is low and insignificant. However, it needs to be mentioned that the spread of extreme values was much higher in agreement parishes, saying that some few but very negative responses contributed to an overall higher average value, leading to a more negative assessment that was hence closer to that of non-agreement parishes. Additionally, households from areas with CRMAs were better informed about their rights and duties concerning the utilization of forest resources, as compared to households living in non-agreement parishes. This may have influenced the assessment of the relationship as well.

5.1.2.3 Off-farm and non-farm activities

In Ellis' work on 'Rural Livelihoods and Diversification in Developing Countries' one can read about rural households that "for many such households farming on its own does not provide a sufficient means of survival in rural areas" (Ellis 2000: 3). This is why households are often found to depend on various other income generating activities. Which other activities people pursue depends on their endowments of assets in turn. If people are poorly educated, have no or little access to financial means and do not possess necessary physical assets, the possibilities to engage in alternative livelihoods are very restricted. 50% of the interviewed households engaged in off- or non-farm activities.

Off-farm activities are defined as agricultural activities on land that is not owned by the household itself. Among those activities, agricultural piece work and selling and trading agricultural output, defined as the buying and trading of other farmers' harvests, were mentioned most frequently. In parishes without resource use agreements, more households were observed to engage in agricultural piecework, while fewer households engaged in agricultural output and input trading than in agreement parishes. Both of these differences are statistically significant across sub-samples. An explanation for this might be the difference in land size, with comparably more households having very little or no arable land in non-CRMA areas and thus being forced to engage in agricultural piece work for income generation. Larger landholdings in turn can be associated with a more diversified portfolio of crops, including also more cash crops, and may have induced households to trade more intensively in those areas.

Non-farm activities are, simply speaking, activities not related to agriculture, and examples mentioned during household interviews include running a shop, riding a motor- or bicycle taxi, brewing and selling beer, making stones, carpentering furniture, preparing and selling food, cleaning public buildings, teaching in schools and charging and repairing mobile phones.

5.1.2.4 Remittances

Remittances were received by approximately 16% of all the households, whereby 61.5% of households that received remittances stem from parishes with CRMAs, while the other 39.5% come from non-participation parishes. The reasons for receiving remittances are similar, independent of location or participation in CRMAs. In half of those cases household heads were very old, either living by themselves, or with some of their grandchildren. Another quarter of the recipients lived in rather small and newly established households, and received support from their parents or others. Lastly, the remaining households that received financial support from family and friends were those who were hit by heavy rain or landslides, which had resulted in severe harvest losses between January 2010 and January 2011.

5.2 Income and wealth estimation

After describing the sample and sub-samples in terms of socio-demographic characteristics, including the access to assets, and livelihood activities, income and wealth outcomes of those activities will be presented. Moreover, multiple linear regression models at the end of each of the sections aim at explaining differing income and wealth levels across sub-samples.

5.2.1 Income estimates

In Table 4 incomes from the different livelihood activities for both the total sample and the sub-samples according to their participation in collaborative management are summarized. An initial inspection of the figures reveals that differences in total income across sub-samples are mainly due to differences in income from crop cultivation.

But to begin with, livestock income will be looked at. Subsistence and cash gross incomes from livestock appear to be similar across sub-samples. Total income from livestock differs, however, due to differences in the costs incurred. But just as for the cash and subsistence incomes, the difference is not significant on any relevant significance level. Moreover, average total net income from livestock is highly negative, due to large and regular expenses on medical treatment, fodder, and other things such as ropes, salt licks and shelter. Average livestock net income is around -360,000 UgShs, with a standard deviation of around 1,000,000 UgShs, an indicator for the extreme values, positive and negative, being involved in this type of livelihood activity.

It has been repeatedly reported that especially during the cold months of the rainy seasons chances were high that animals would die, hence, making regular medical treatment inevitable. This is true irrespective of whether the household is classified as poor, medium or rich, benefits from a CRMA, or stems from a particular study site. However, the negative magnitude of livestock income is bigger for poorer households, and for households stemming from areas not benefiting from collaborative resource management.

It appears that it is rather the possibility to use livestock as collateral or as means to save money that makes animal husbandry important for the sample population.

Table 4: Income in UgShs from various sources by participation in CRMA

Household income source	Sample mean in UgShs		Sample mean in $-US	CRMA = 1		CRMA = 0	
Total livestock net income	-358,626.7	(1,038,932.0)	-152.6	-504,245.6	(1,166,558.0)	-213,007.9	(884,353.4)
Livestock subsistence income (gross)	91,976.3	(162,900.8)	39.1	103,316.3	(156,721.6)	80,636.25	(170,083.3)
Livestock cash income (gross)	149,570.0	(501,666.4)	63.6	165,528.8	(497,694.8)	133,611.3	(511,437.9)
Total crop net income**	1,027,216.0	(1,091,867.0)	437.1	1,325,131.0	(1,299,210.0)	729,300.0	(738,181.0)
Crop subsistence income (gross)	779,166.9	(763,289.5)	331.6	908,666.3	(873,691.0)	649,667.5	(618,404.6)
Crop cash income (gross)***	466,668.8	(650,473.6)	198.6	764,187.5	(779,560.3)	169,150.0	(260,369.9)
Income from tree cultivation**	48,909.4	(81,070.9)	20.8	27,750.0	(64,631.3)	70,068.75	(90,652.6)
Total farm net income	738,498.3	(1,484,523.0)	314.3	848,635.6	(1,647,719.0)	628,360.9	(1,313,112.0)
Total environmental income	311,927.1	(311,927.1)	132.7	345,658.0	(345,658.0)	278,196.3	(228,429.2)
Environmental subsistence income	272,649.6	(241,145.7)	116.0	276,702.9	(252,721.7)	268,596.3	(232,145.6)
Environmental cash income*	39,277.5	(148,085.8)	16.7	68,955.0	(201,712.7)	9,600.0	(43,890.8)
Non- and off-farm income	625,183.8	(1,473,676.0)	266.0	769,112.5	(1,693,472.0)	481,255.0	(1,220,159.0)
Remittances	90,000.0	(455,088.0)	38.3	85,975.0	(309,757.3)	94,025.0	(568,803.8)
Total net income / household	1,765,609.1	(1,852,306.0)	751.3	2,049,381.0	(2,050,729.0)	1,481,837.0	(1,606,044.0)
Total net income / AEU**	374,513.8	(414,750.0)	159.4	455,157.4	(459,570.9)	293,870.1	(351,994.5)

*n=80, *indicates significant differences across categories: *** = significant at P < 0.001, ** = significant at P < 0.05, * = significant at P < 0.1; standard deviations in parentheses; Kruskall-Wallis tests used to check for differences across sub-samples; 1USD = 2350UgShs*

Income from crop cultivation is the biggest contributor to total household income. This share is almost twice as high for households living in parishes with agreements as compared to households living in parishes without resource use agreements. This may be due to the difference in the size of landholdings, but other reasons are also possible, and will be investigated later.

The large and significant difference across sub-samples in total crop income stems mainly from large variations in cash income from crop cultivation. By contrast, subsistence income from crop cultivation is relatively equal across households, ranging around 600,000 UgShs, except for households located in Bugitima sub-county that obtain almost double as much subsistence income from crop cultivation as the rest.

Cultivation of Eucalyptus trees for fuelwood generation was listed as a separate source of income, because it may reflect some sort of adaptation mechanism by those people that are not able to collect as much firewood from the park as they wish to. This notion can be confirmed by the fact that income from tree cultivation is more than double as high in non-agreement areas as in areas with agreements. However, no particular research on prevailing agro-forestry techniques in non-agreement locations has been conducted, limiting the validity of the above mentioned statements.

Combining incomes from tree and crop cultivation, as well as animal husbandry yields the household's farm income, which is still displaying some differences across sub-samples, but not on a relevant significance level. It is around 700,000 UgShs per household per year, with a median value considerably lower though, namely 500,000 UgShs. This skewness also results from a considerable number of cases with negative farm income.

Environmental income is somewhat higher for households from parishes with resource use agreements as for households from non-agreement parishes. Differences are not significant, however. Cash income generated from the collection of environmental resources varies tremendously across sub-samples, but this needs to be interpreted with care, as only 11 households from the sample got any cash income through selling forest products.

Non- and off-farm incomes were obtained by half of the sample, and the amounts earned were usually quite high. On average, non- and off-farm income reached a level of almost 600,000 UgShs, ranging from an average value of around 945,700 UgShs in Bugitima sub-county to

366,460 UgShs in Tsekululu sub-county. One of the reasons for the high magnitude of non- and off-farm incomes is that most of these activities were pursued all year around and thus contributed quite significantly to the total income.

Remittances also differ extremely across locations, but again they were received by only a small number of households in each area. Average values are quite similar for parishes participating in CRMAs and parishes not doing so.

In terms of total household income, communities having active CRMAs obtain incomes that are on average almost 20% higher than those for the total sample, while incomes from households situated in communities without CRMAs are about 20% lower than the mean income. Yet, both groups display a very large spread of incomes, ranging from -808,300 UgShs (-344 $-US) to 6,461,600 UgShs (2750 $-US) for communities without agreements, and from -859,600 UgShs (-366 $-US) to 8,749,300 UgShs (3723 $-US) for communities with agreements. A student's t-test could not confirm any significant difference in the means of the total annual household net incomes for the two sub-samples. In terms of total income per AEU this difference becomes significant at the 10%-significance level, probably due to the fact that household size differs across CRMA-groups as well, with non-participation households having larger families, increasing the income gap between sub-samples even further.

Multiple linear regression analysis was used to explain total household net income. The model with the best fit, presented in Table 5, yields that the major influencing variables on income are the household's size of landholdings, its own size and the household head's education level, with all of the variables having positive, meaningful and significant coefficients.

Lager landholdings and more years of education lead to higher income, which is an unambiguous result that does not need to be explained any further. Yet, an increasing number of household members also exercises a positive impact on total household net income. This is somewhat ambiguous, as there are arguments supporting both a positive and negative influence of household size on total income. In the following it will be assumed that a larger number of household members increases the chances to pursue many different livelihood activities which in turn contributes to an overall higher household income.

CRMA and distance to the park (measured in minutes) were included in the model and increased the fit considerably, as opposed to other variables such as livestock units. However, the coefficients happened to be insignificant and negative, indicating a negative impact of

CRMAs and park distance on total household income, which is somewhat counterintuitive. For different model specifications the CRMA coefficient happened to be either positive or negative. This may be due to a number of different reasons, for example the small sample size, measurement errors or the interaction of the CRMA-variable with some of the other independent variables. It does not mean, however, that an effect of resource use agreements on the magnitude of for example environmental income is impossible, as will be seen later in the analysis. It may simply indicate that overall income, a complex measure consisting of many different sub-incomes cannot be expected to vary significantly across participation areas due to differing access to forest environmental resources. That means that an 'effect-causality' between CRMAs and income could not be confirmed.

Table 5: Multiple linear regression model to estimate total household income

Absolute net income	Coefficient	Standard error	t	P > |t|
Hectare	2,020,802.0	316,737.2	6.38	0.000
AEU	142,056.7	70,176.1	2.02	0.047
Education	75,650.9	45,487.0	1.66	0.101
CRMA	-179,259.9	362,552.4	-0.49	0.622
Distance (min.)	-296.2	9014.5	-0.03	0.974
_cons	-329,878.8	462,878.4	-0.71	0.478

**OLS-regression, number of observations = 79; R-sq = 0.4734, adj R-sq = 0.4373*

Other model specifications, such as a random-effects GLS regression with region/study site as group variable, did not yield better results in terms of fit or significance of coefficients. Neither log-conversions of the continuous variables, nor the usage of robust standard errors changed the results obtained above for the better.

5.2.2 Wealth estimates

Presenting figures on wealth in addition to income figures makes sense for a number of reasons. First, wealth is a better indicator for long-term economic wellbeing than is annual household income. Second, wealth displays changes in assets that would be otherwise difficult to capture in an income measure, as it was chosen for this work.

In Table 6 results of the wealth estimation are presented. Just as income differs across sub-samples, so does wealth. Again, households from parishes participating in collaborative resource management are on average richer than households not participating in collaborative resource management. The overall difference is quite large and significant on a 1%-significance level. Households from Buginyanya are richer than households from Bugitima, whereas households from Bubyangu and Tsekululu are similar with respect to their wealth levels.

Table 6: Wealth levels around MENP by participation in CRMAs

Assets	Sample mean (mill. UgShs)	Sample mean ($-US)	CRMA = 1 (mill. UgShs)	CRMA = 0 (mill. UgShs)
Personal belongings **	0,14 (0,41)	59.6	0,24 (0,56)	0,04 (0,09)
Landholdings***	3,60 (4,12)	1,531.9	5,41 (4,86)	1,70 (1,93)
Livestock	0, 87 (1,12)	370.2	0,84 (0,76)	0,91 (1,40)
Total wealth***	4,61 (4,52)	1,961.7	6,50 (5,10)	2,65 (2,87)

** indicates significant differences across categories: *** = significant at P < 0.001, ** = significant at P < 0.05, * = significant at P < 0.1; t-tests used to check for differences, standard deviations in parentheses*

The difference in total wealth across parishes with and without agreements is mainly due to the significant difference in the value of landholdings. This may be due to two reasons, on the one hand the higher estimates for hectare-prices in agreement parishes, and on the other hand the larger size of landholdings in these parishes. Also the values of personal belongings differ significantly across participation groups, thus contributing to the difference in the total estimates. Livestock seems to be of similar importance for both of the sub-samples, just as income from livestock was found to be of rather similar importance across sub-samples.

Wealth decreased in the period from January 2010 to January 2011. This decline was mainly driven by changes in livestock, which occurred consistently across sub-samples, i.e. irrespective of region, participation group or poverty status. Further inspection of the change

in livestock assets yielded that even when controlling for other household characteristics such as for example household head's age, sex and education changes in livestock value were negative. Yet, changes were much steeper for female-headed households than for male-headed ones, but due to the small number of female-headed households in the sample population this might be more speculation rather than a real trend.

What were the reasons for the decline in livestock? Many households reported dying of animals due to diseases in the cold and rainy seasons, and slaughtering or selling of animals to free financial means. Killings through predators stemming from the park were also mentioned, in particular that chicks were taken by raptors coming from MENP.

To finish this section, results of the multiple linear regression analysis explaining wealth are presented in Table 7. Explanatory power of the model is at slightly more than 76%.

Table 7: Multiple linear regression model to explain total wealth around MENP

Total wealth	Coefficient	Standard error	t	Pr (> |t|)
Hectare	5,922,794.0	5,135,509.4	11.53	0.000
Livestock	894,760.9	263,365.9	3.40	0.001
Distance (min.)	-37,891.2	14,315.9	-2.65	0.010
CRMA	1,494,209.0	574,782.0	2.60	0.011
Education	159,395.4	74,576.0	2.14	0.036
AEU	-121,628.0	117,119.2	-1.04	0.303
_cons	85947.5	733,585.7	0.12	0.907

**OLS-regression, number of observations = 79; R-sq = 0.7788, adj R-sq = 0.7604*

As with the income regression, the size of a household's landholdings turned out to be a major determinant for the wealth level. But unlike for income, livestock has a significant and positive influence on wealth, confirming the notion that livestock is more important as a means to save money rather than to generate (cash) income. The distance to the park does again have a negative influence, although the magnitude of the coefficient is relatively small. CRMAs appear to exercise a major positive influence on the level of wealth. Yet, inferring 'effect-causality' between CRMAs and the wealth level is not necessarily useful. The exclusion of the CRMA-variable from the regression reveals that the fit is only minimally reduced, namely to 74.15%, hence assigning rather low explanatory power to CRMAs. Other

major influencing determinants for the wealth level are the household head's education and the size of the household itself.

To sum up the sections on income and wealth estimation, it can be noted that the impression arose that communities with CRMAs are on average better off than those without agreements, both in terms of income and wealth. However, so far little evidence for CRMAs contributing significantly to the differences in economic wellbeing across sub-samples was found. Hence, it might rather be that study sites selected for negotiating collaborative resource use agreements are better off from before, selected specifically for this reason. Whether this notion changes after diversification, forest dependence, and distribution have been analyzed, remains to be seen.

5.3 Diversification of livelihoods

After having presented the sample's asset endowments, its different income generating activities, including economic results; a closer look will be taken at livelihood outcomes, the first of which is livelihood diversification.

As has been reviewed in the theory chapter, diversification of livelihoods is a fundamental characteristic of rural peasant communities living adjacent to forested areas (Ellis 2000). Yet, patterns of diversification may differ highly according to the types of assets that a household has access to. Also, diversification may not only happen between different livelihood activities but also within one activity, for example in the form of on-farm diversification. All of the issues just mentioned will be discussed in the course of this chapter, one by one.

5.3.1 The degree of diversification

At first it will be shown that diversification does indeed play an important role for the MENP-sample. The income table presented earlier in this chapter indicated that total household income is comprised of a large number of sub-incomes that are all due to different income activities. But how many households actually pursue more than one livelihood activity? An overwhelming majority of 96.25% of the households do so. Thereof, 53.75% pursue two different income generating activities, 28.75% follow three different activities, 8.75% engage in 4 income activities, while 5% of the sample pursue five or six differing livelihood activities.

In Table 8 this notion of diversification is displayed in a slightly different way, namely by listing a 'strategy variable' that is ranking income activities according to their economic importance. On a scale from one to six, with one being the most important income activity, crop cultivation scored highest, followed by off- and non-farm activities. Forest environmental income is according to this exercise the third most important contributor to total income. As was seen earlier, livestock plays only a minor role for income generation, but is of importance nonetheless. Other activities include for example the cultivation of trees, which was treated as a separate income strategy, and receiving of remittances.

Table 8: Importance of various income sources

Activity	Average[a]	St. deviation	Minimum	Maximum	n
Crop	1.5	0.79	1	4	75
Off-farm	2.0	1.02	1	4	40
Forest	2.3	0.87	1	4	70
Trees	3.1	0.90	2	5	27
Remittances	3.2	1.52	1	6	13
Livestock	3.6	1.10	1	6	72

* *[a] for the n cases where this type of income was reported*

The overall notion changes little when the sample is sub-divided by CRMAs. Crop cultivation, off-farm activities and forest environmental activities are still the three most important strategies, though forest activities score slightly higher among households living in parishes with CRMAs, while the reverse is true for off-farm activities.

Yet, diversification per se does not ensure higher total household income. It depends on the activities chosen for diversification. That is why the pattern of diversification will be analyzed in the next section.

5.3.2 The pattern of diversification

One way of approaching the question whether income diversification merely works as a means to survive or as a deliberate strategy to improve standards of living is by looking at how many different income activities households pursue, while controlling for their income level. Table 9 gives a hint at what role income diversification for the Mount Elgon sample might play, namely that of a strategy to improve living standards.

Table 9: Relationship between income diversification and income level

Number of income activities	Income category			
	Poor	**Medium poor**	**Less poor**	**n (%)**
1 - 2	21 (78)	16 (62)	9 (33)	46 (57.5)
3 - 4	6 (22)	9 (34)	15 (56)	30 (37.5)
5 - 6	0 (0)	1 (4)	3 (11)	4 (0.05)
n (%)	27 (100)	26 (100)	27 (100)	80 (100)

**column percentages are given in parentheses, income categories according to total household net income*

From Table 9 it can be seen that the large majority of poor households engages in one or two income activities, while only one third of the richest does so. On the contrary, 11% of the richest households pursue five or six income activities, while none of the poorest households engages in so many activities. The overall pattern is thus apparent, more income activities are associated with higher incomes.

Another notion touched upon in the theory chapter was that poorer households are more often characterized by individual level diversification, whereas richer households can be portrayed by household level diversification. This notion is however difficult to examine in a purely econometric way. Nonetheless, some indicators exist, confirming that poorer households more often engage in individual level diversification. For example, none of the households characterized as rich in the sample engaged in agricultural piece work, a non-farm activity often pursued by household heads and their wives to earn income, in addition to their own crop income. Furthermore, the household head's education is negatively correlated with being a casual laborer, confirming that poorer households with less educated household heads tend to engage in agricultural piece work. Bigger households were observed to pursue a larger number of income activities. This gives large households the chance to better specialize in different activities, whereas in small households often one person needs to pursue two or more activities. Also for the poorest households, crop cultivation, forest environmental activities and casual laboring scored almost identically on the 'strategic variable' scale, with values of 1.74, 1.76 and 1.6 respectively. These are typical activities that can be pursued by a single person, thus indicating that more individual level diversification takes place among poorer households.

Finally, the relationship between forest environmental income and diversification will be briefly examined. Pairwise correlation yields that there is a weak positive relationship (corr = 0.158) between the magnitude of the income from forest environmental activities and the total number of activities pursued, which is however statistically insignificant and may be easily due to the small sample size. Yet, when CRMAs are included in the analysis this changes. Then the positive relationship between forest environmental income and diversification is much stronger (corr = 0.332) and significant at a 5%-significance level, indicating that in parishes with CRMAs forest environmental activities are an integral part of diversification efforts, as opposed to areas without resource use agreements (corr = -0.062). It needs to be

mentioned though, that inferences on the basis of pairwise correlations are problematic and need to be handled carefully.

To sum up, extensive diversification could be observed to be prevalent in the MENP-sample. It is positively related with economic wellbeing, confirming the commonly agreed upon idea that diversification is as an integral strategy in rural peasant societies to improve standards of living. Moreover, forest environmental activities were found to be an integral part of the livelihoods of the majority of the households, confirmed by the knowledge gained before, namely that it is the third most important activity in terms of economic contribution to total income after crop cultivation and off- and non-farm activities. This is true more so for households located in areas with resource use agreements than for households not benefiting from CRMAs. Some evidence was found confirming the pattern that poor households more often resort to individual level diversity as opposed to household level diversity, which is more commonly pursued by relatively richer households.

5.3.3 On-farm diversification

Diversification may be motivated by a number of reasons, one of which is reducing risk, stemming from seasonality, natural vagaries or idiosyncratic shocks. In general, less risk correlation will be experienced if several different on-farm, off-farm, and non-farm activities are combined in one livelihood portfolio. However, the poorest households with the least educated household members can often only choose between on-farm production and non-farm wage labor, two activities that are closely related in terms of risk. Therefore, efforts are frequently directed at the cultivation of a large variety of crops, so as to best utilize farmland. But there again, households are exposed to severe risk as e.g. droughts or massive rain may affect all crops simultaneously. The following paragraphs will deal with on-farm diversification and how this is correlated with the sample's household specific and contextual characteristics.

To begin with, crop cultivation will be examined. For the entire sample the average number of cultivated crops was 6.82, with a median value of 7. This is a high number considering the small average size of landholdings. For households located in parishes with CRMAs this number increases to 7.5, whereas that for non-agreement areas decreases to 6.15. In both cases are mean and median values almost identical.

The majority of the households cultivated two to three starch crops such as maize, matoke, yam or cassava; coffee as cash crop; and lastly beans or some type of vegetable. With an increasing number of crops, vegetables were cultivated more often and in more varieties. Most commonly cultivated vegetables were onions, cabbage, tomatoes and avocadoes, and were mostly grown for selling, rather than for own-consumption.

Table 10 summarizes the different sources of crop income and to what extent they contributed to total crop income, both for the total sample and for participation groups.

Table 10: Crop income from various sources in UgShs by participation

Income source	Sample mean	Standard deviation	%	Participation in CRMA			
				Yes	%	No	%
Staple	943,646.7	975,390.3	72	1,121,436.0	63.7	765,857.9	88.8
Coffee* **	215,033.0	377,312.9	16.4	369,407.9	21	60,657.9	7
Vegetables* **	129,252.6	245,924.6	9.8	233,031.6	13.2	25,473.7	3
Fruits	23,473.7	72,853.4	1.8	37,023.7	2.1	9,923.7	1.2
CI (gross)* **	1,311,406.0	1,189,833.0	100	1,760,899.2	100	861,913.2	100

** indicates significant differences across categories: *** = significant at P < 0.001, ** = significant at P < 0.05, * = significant at P < 0.1; t-tests used to check for significant differences; all values given in gross terms*

In areas with CRMAs, the portfolio of crops is more diverse as can be seen from the table above. More cash crops, vegetables and fruits are cultivated, next to starch crops, which are the main contributor to total crop income. Crop income is significantly correlated with the number of cultivated crops, which is in turn significantly correlated with larger landholdings. This finding points towards on-farm diversification as being a deliberate strategy of households to improve their standards of living, meaning that once more land is available, more crops yielding high cash income are cultivated.

Proving a possible impact of boundary management agreements on the types and numbers of crops cultivated is difficult. First of all, the variables BMA and CRMA are dummy variables that can be also understood as dummy variables for Bugitima and/or Buginyanya sub-county. In regression analyses those variables will inevitably take on some of the effects of larger landholdings and higher education that are predominating in those areas. Moreover, there is no particular information on which household actually participated in boundary management, making more detailed investigations on BMAs difficult.

To sum up, on-farm diversification was identified as a commonly pursued strategy to increase crop income. Larger landholdings are positively correlated with a larger number of crops and a higher total crop income. It will be now of interest to see how diversification relates to forest dependence and poverty, the issues that will be discussed in the next sections.

5.4 Dependence on environmental income

In this chapter a closer look will be taken at forest environmental income and the role it plays as the third most important livelihood activity. To begin with absolute and relative magnitudes will be examined and compared to other income sources. Then dependence will be further analyzed with regard to household specific characteristics and contextual variables, one of which is the participation in collaborative resource management.

5.4.1 Absolute forest environmental income

87.5% of the interviewed households acquired environmental income from consuming and/or selling forest environmental resources such as firewood, bamboo shoots and stems, mushrooms, leafy greens, honey and medicinal plants. On average, absolute environmental income reached 356,488 UgShs per year and household, corresponding to approximately 152 $-US, while the median income was at 277,368 UgShs (118 $-US) only. Values ranged from 21,000 UgShs (9 $-US), found in Bugitima sub-county, to a maximum of 1,372,368 UgShs (584 $-US), found in Buginyanya sub-county. The exclusion of 6 extreme cases, each one with environmental income higher than 800,000 UgShs, would give a new mean that is considerably closer to the median. As was already mentioned, absolute forest environmental income varies only slightly by region, where figures are highest for parishes situated in Buginyanya and Bugitima sub-counties. These are also the parishes participating in collaborative resource management agreements, although statistical tests could not confirm that any of the differences were significant.

But which are the forest resources people actually utilize for income generation and how does resource collection differ across sub-samples? Table 11 gives a brief overview of the various forest products that were collected on a regular basis by the sample population. Their importance is indicated by the corresponding order, which was obtained through ranking the resources according to the number of times they were mentioned to be collected by the respondents.

Table 11: Forest resources ranked by occurrence

Resource	Total sample	CRMA = 1	CRMA = 0
Firewood	65 (81.25)	37 (92.5)	28 (70)
Vegetables	48 (60)	34 (85)	14 (35)
Bamboo	36 (45)	28 (70)	8 (20)
Medicine	34 (42.5)	23 (57.5)	11 (27.5)
Mushrooms	22 (27.5)	17 (42.5)	5 (12.5)
Fodder	11 (13.75)	2 (5)	9 (22.5)
Honey	4 (5)	4 (10)	0
Charcoal	4 (5)	2 (5)	2 (5)
Poles	3 (3.75)	3 (7.5)	0
Ropes	2 (2.5)	2 (5)	0
Manure	1 (1.25)	0	1 (2.5)
Own trees	30 (37.5)	11 (27.5)	19 (47.5)
Total mentioned	**260**	**163**	**97**

**unit: count; percentage of total number of times mentioned in parentheses*

In general it can be seen that in areas with agreements, the forest product portfolio is much more diversified than in areas without agreements, which was to be expected. It can also be confirmed that firewood is by far the most important forest product, both for communities benefiting from CRMAs and for communities not benefiting from CRMAs, though to a varying extent. Interestingly, people living in non-agreement areas collect much less firewood, even though they have the same rights as the other households living in CRMA-areas. This might be due to the larger legal insecurity experienced in those parishes.

Table 12 summarizes the results of the multiple linear regression analysis (with robust standard errors) conducted to explain the magnitude of absolute forest environmental income. Next to CRMAs, also the household's size, land size, distance to the park and total income turned out to be of significant influence on forest environmental income. As one would expect, the access to CRMAs has a strong and significant positive influence on forest income, as has the size of the household. This confirms what was found out earlier, namely that forest environmental activities are important part of diversification strategies. Larger landholdings exercise a significant negative impact on environmental income, an intuitive result. Including education contributed to a better fit, lying at around 31%, with a coefficient being slightly less significant than on the 10%-significance level. Lastly, the effect of the distance to the park and the total household income are discussed. Both coefficients are significant but whether they are also meaningful is questionable. Still, especially the inclusion of the total income

increased the fit considerably. It might be that due to some interaction the coefficient turned out to be rather difficult to interpret, not saying however that it is unimportant.

Table 12: Multiple linear regression model to estimate forest environmental income

Absolute forest income	Coefficient	Robust std. errors	t	P > |t|
AEU	41149.4	10331.6	3.98	0.000
CRMA	192658.7	73188.7	2.63	0.011
Hectare	-205972.4	90756.8	-2.27	0.027
Total HH income	0.063514	0.03087	2.01	0.044
Distance (m)	-30.26008	15.0917	-2.01	0.049
Education	-12613.2	7682.3	-1.64	0.106
_cons	149559.4	63920.5	2.34	0.022

**multiple linear regression; number of observations = 70; R-sq overall = 0.3119*

5.4.2 Relative forest environmental income

Matters change when relative, instead of absolute, forest environmental income is considered. First of all it can be stated that six households have a higher absolute environmental income than their total household net income, i.e. in 7.5 % of the cases in which environmental income was acquired, it contributes to more than 100% to the household's total annual net income. Treating those six cases as outliers would give a mean relative environmental income of 23.5%. This corresponds well to the value of 22% found in earlier studies dealing with the dependence on forest-related environmental income in rural areas of Africa and Asia (Vedeld et al. 2004).

However, in order not to reduce the already small sample any further, outliers won't be deleted. Then relative forest environmental income is at 32.5% of total household income, with a median value of about 20% only, resulting from the six extreme values just mentioned. Disaggregated by region, values range from 17% for Bugitima to 53% for Buginyanya sub-county. Relative forest environmental income in Bubyangu and Tsekululu sub-counties, the two non-agreement areas, amounts for 35% and 25% of total income, respectively. Overall differences across participation groups are relatively similar and insignificant.

As was hypothesized in the second chapter, poorer households are more dependent on environmental income than richer households. It needs to be mentioned, however, that the use of the word 'dependence' may convey an exclusively negative role of forest income for rural

livelihoods. Yet, in some cases access to park resources could also be an opportunity to specialize and generate cash income, rather than being an employment of last resort. This should be kept in mind throughout this section.

When dividing the sample by income, values for relative environmental income differ considerably, and statistical tests verify that the differences between income groups are significant on a 5%-significance level, as opposed to the differences for absolute environmental income across the same groups. For the poorest third of all the households environmental income makes up for almost 58% of the total income, whereas the richest third of the households receives only around 14% of its total income from environmental resource utilization. Table 13 summarizes these results briefly.

Table 13: Relative environmental income by participation and income group

REI	All	Standard deviation	Without CRMA	Standard deviation	With CRMA	Standard deviation
Poor	0.58	0.80	0.47	0.52	0.80	1.20
Medium poor	0.25	0.25	0.19	0.15	0.31	0.32
Less poor	0.14	0.13	0.10	0.10	0.15	0.15
All	0.33	0.52	0.30	0.39	0.35	0.64

**n=80, chi^2-test with p = 0.015*

A clear relationship between forest dependence and economic performance becomes visible. This relationship remains, even when controlling for CRMAs, i.e. the poorer a household, the more dependent it is on forest environmental income. What is more, the magnitude of dependence is higher in parishes with CRMAs, than in the other two parishes. The poorest households in Bugitima and Buginyanya depend to around 80% on environmental income. Yet, this high value should be treated with care, especially with the small sample size and potential measurement and estimation errors in mind.

In the following, dependency on forest environmental cash and subsistence income will be reviewed briefly. An inspection of the forest income subsistence share (FISS) shows that the poorest third of the sample has a share of almost 50%, while the medium poor have a share of 32% and the least poor only a forest income subsistence share of 27%. These differences are significant on a 5%-significance level. These numbers are high and reveal the importance of the forest as source for subsistence income. In non-agreement areas, the poorest households obtain as much as 50% of their subsistence income from forest resource utilization. Again,

richer household in agreement-areas depend more on forest environmental subsistence income than their counterparts in non-agreement areas.

Only 11 households earned cash income from selling forest resources between January 2010 and January 2011, reaching an average cash income of 285,655 UgShs (122 $-US). After excluding one outlier with a cash forest environmental income of 1,092,000 UgShs (465 $-US), cash income from forest products ranges between 20,000 UgShs (8.5 $-US) and 430,000 UgShs (183 $-US), with the new mean of environmental cash income of 205,020 UgShs (87 $-US) being somewhat higher than the median of 182,000 UgShs (77 $-US). In 72.73% of the cases cash income was acquired in areas that were participating in collaborative resource management. In those areas cash income from forest resources made up for 20% of overall environmental income. The forest (environmental) income cash share (FICS) of overall cash income was about 31%, without any big differences between parishes with and without CRMAs. For the different income groups significant differences in the forest income cash share could be found. Cash share for medium poor is highest, up to 45% of total cash income, pointing at the middle income segment as the group that is mainly utilizing the forest for cash generation, whereas the poorest are expected to collect forest environmental resources rather for subsistence than cash income generation.

To sum up, by and large similar patterns prevail when dividing forest environmental income into cash and subsistence contributions as before. It is the poorest households that depend most on forest environmental income. When it comes to cash income, the medium poor gain most from the forest. Controlling for CRMAs, reveals that it is the households located in agreement parishes that are depending more on forest income, most probably due to the better access to the park's resources, i.e. out of choice rather than necessity.

5.4.3 Household specific characteristics and forest dependence

As was seen in the former section, forest environmental resources, although to a varying degree, play an important role in income generation for all the households regardless of location, participation in collaborative resource management or income level. Even the richest households of the sample obtained around 14% of their total income from forest income.
Yet, it is the very poor households stemming from parishes with CRMAs that are exhibiting the highest degree of dependence. How are these households characterized? And what distinguishes them from their poor counterparts from non-agreement areas? Do they differ

with regard to additional characteristics other than participation in collaborative resource management? Table 14 summarizes the most important results.

Table 14: Household specific factors of the poorest income group by participation

		CRMA = 1			CRMA = 0		
Factor	**Unit**	**Mean**	**St. dev**	**n**	**Mean**	**St. dev.**	**n**
Distance* **	Meter	2583.3	1785.4	9	823.9	550.8	18
AEU	Count	4.7	1.7	9	5.9	2.6	18
Land **	Hectare	0.48	0.44	9	0.24	0.20	17
Education	Years	4.1	2.7	9	2.39	2.8	18
Age	Years	50.7	16.5	9	51.3	12.6	18
TLU* **	Count	1.9	0.8	9	0.9	0.7	18
Crop income	UgShs	530,633.3	645,466.8	9	430,991.8	425,539.8	18
Farm income **	UgShs	-428,772.2	583,446.6	9	120,204.4	545,267.6	18
Forest income	UgShs	437,365.1	337,329.8	7	315,631.3	204,637.4	16
Total income*	UgShs	128,622.9	548,019.5	9	561,304.4	598,128.7	18

** indicates significant differences across categories: *** = significant at P < 0.001, ** = significant at P < 0.05, * = significant at P < 0.1; t-tests used to check for differences*

The first thing to note is that there were twice as many poor households in parishes not benefiting from agreements, as compared to areas with agreements. Secondly, poor households in Bubyangu and Tsekululu had on average bigger households, less educated household heads, smaller landholdings, fewer livestock, and lower crop incomes. They were also situated much closer to the park's boundary. Still, they were less dependent on environmental income than their poor counterparts from agreement-parishes, with dependence amounting to 47% and 80% respectively.

When checking for farm income, it becomes clear that poor households in CRMA-areas have tremendous costs related to livestock, reducing their overall farm income below zero. Hence, it can be assumed that forest environmental income serves as some kind of 'equalizing' income for those people experiencing major livestock expenses. Nevertheless, the poorest households from communities with agreements appear to be still considerably worse off than poor households from non-agreement areas, which is a somewhat surprising result. But as has been acknowledged earlier, they are much richer in terms of wealth than the poorest households from non-agreement areas, putting things back into perspective.

A statistically significant relationship between relative environmental forest income and the total farm net income exists, also for the total sample, and in combination with other major household specific variables farm income explains roughly 21% of the variance in relative forest environmental income. A simple multiple linear regression model produced the following output:

Table 15: Multiple linear regression to explain relative forest environmental income

Relative forest income	Coefficient	Std. Error	t-value	P > |t|
Farm net income	-1.21e-07	3.91e-08	-3.10	0.003
Education	-0.040050	0.01628	-2.46	0.017
No. of income activities	-0.172650	0.07370	-2.34	0.022
AEU	0.063340	0.02826	2.24	0.028
CRMA	0.214804	0.12364	1.74	0.087
Distance (min.)	-0.004960	0.00356	-1.39	0.169
_cons	0.807292	0.21533	3.75	0.000

**OLS regression; number of observations=70; R-sq = 0.2809; adj R-sq = 0.2124*

A look at the regression output table yields that relative forest environmental income is negatively correlated with park distance, years of education, number of income activities that a household pursues, and the farm net income. That is to say that households are less dependent on forest environmental income the higher their farm income and the more income activities they pursue, the further away they reside from the park and the better educated its members are. However, magnitudes of all but one coefficient, namely the one for number of income activities, are rather small and may be difficult to interpret.

Participation in collaborative resource management and the number of total household members have a positive influence on forest dependence, whereby the CRMA-coefficient is significant on a 10%-significance level only. One should have expected the land size to be an important independent variables affecting the magnitude of dependence on forest environmental income. Yet, including this variable in the regression model did not yield any significant coefficient and additionally decreased the adjusted R-square.

To sum up, poorer households depend more on environmental income, more so if the household is coming from an area with CRMA. Even though the poorest third of the households residing in agreement parishes are better off in terms of access to assets, their farm income is negative and their total income much lower than that of other poor households, not residing in areas with CRMAs. How can this result be interpreted? Is it

because of CRMAs that poor household are more dependent on forest environmental income? Or did they maybe choose to intentionally spend more on livestock, while compensating losses with forest income? Arguing for the latter may seem a bit farfetched, regarding the low level of total income. However, due to the low fit of the regression model and the insignificant coefficient of CRMAs on relative forest environmental income, it is neither possible to argue that the high forest dependence is an unambiguous consequence of the participation in collaborative resource management.

5.5 Distribution of incomes around MENP

This section aims at analyzing the relationship between inequality and poverty on the one hand and environmental income on the other hand. One question to be answered is whether forest environmental income contributes to a widening or closing of the income and/or wealth gap within a village. The second issue to be considered is whether villages benefiting from CRMAs perform better in terms of poverty reduction and equal income distribution than their counterparts in non-agreement parishes.

5.5.1 Inequality

The degree of inequality of a distribution can be (statistically) measured in various ways. To begin with, it often helps to simply look at the income and how it is distributed among the sample. Figure 5 shows total annual net income per AEU, and reveals an income distribution that is heavily skewed. A positive skew value of 2.13 indicates that the tail on the right side is longer than the one on the left side and that most of the values lie to the left of the mean. That is, relatively many people have a total net income smaller than the average, and relatively few people have a total annual net income higher than the average.

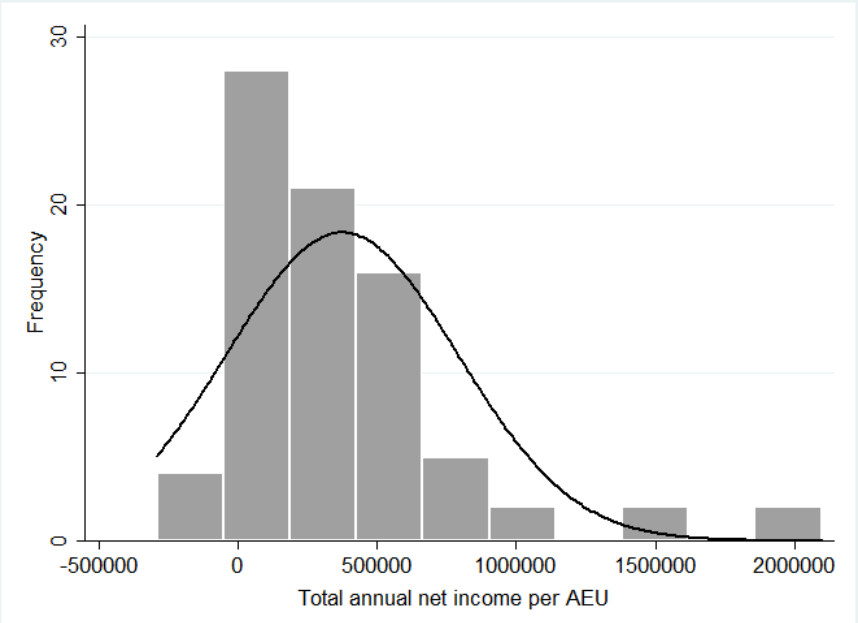


Figure 5: Distribution of total annual net income per AEU around MENP

Additionally, the kurtosis value of 8.89 is very high, indicating that the distribution contains extreme deviations from the mean, which usually is already a good indicator for inequality.

To see whether forest environmental income contributes to a widening or closing of the income gap, it could be simply excluded from total annual net income per AEU and visualized again, in the way it was done above. However, in order to make more accurate assertions on the role of forest environmental income for income distribution, more elaborate tools are necessary, which is why Gini coefficients are calculated for the analysis of the next paragraphs.

The Gini coefficient is one of the most commonly used measures for assessing income inequality. It is the ratio of the areas on the Lorenz curve diagram. A Lorenz curve simply displays the cumulative incomes from poorest to richest. Then, the values a Gini coefficient can take on range from 0 to 1, where 0 means perfect equality and 1 perfect inequality of a distribution. Seen in an international context, Gini coefficients range from approximately 0.25 for Sweden to 0.71 for Namibia[10], whereby values approaching 0.5 represent severe inequality.

Gini coefficients (G) in this thesis were calculated on the basis of total annual income per AEU (AI), and the total annual income with forest income being excluded (ANI), using the following formulas:

$$G_{AI} = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}\left|AI_i - AI_j\right|}{2n^2\mu}, \text{ and } G_{ANI} = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}\left|ANI_i - ANI_j\right|}{2n^2\mu}, \text{ respectively.}$$

There μ is the mean income per AEU and n denotes the total number of cases. Then, the Gini coefficient for the total sample is $G_{AI} = 0.50$, and increases to $G_{ANI} = 0.57$ when park income is excluded. Thus, at first glance, park income has an equalizing effect on the total sample's income distribution. This is in line with what other empirical studies observed (Vedeld et al. 2004), and with the theory discussed in the second chapter. There it was emphasized that forest environmental income in a rural peasant society context mainly contributes to current consumption. This can be achieved by either utilizing forest environmental income for seasonal gap-filling, regular subsistence use or low-return cash activities (Vedeld et al. 2004). Concerning low-return cash activities, it was thoroughly discussed how the poorest

[10] Source: United Nations Development Programme (2004: 188-191)

households engage in forest income activities, as a sort of last resort employment, and it thus improves their otherwise low incomes, resulting in an equalized income distribution.

It will be now of interest to look at whether this effect differs when analyzed in a regional context and with regard to parishes benefiting from CRMAs as compared to those not benefiting from CRMAs. Table 16 summarizes those Gini coefficients, which range from 0.42 to 0.52, including park income; and from 0.46 to a value as high as 0.62, when park income is excluded. Disaggregating the sample according to participation in CRMA gives Gini coefficients that are equal, i.e. 0.48, or similar when park income is excluded, i.e. 0.56 and 0.55 for parishes with and without CRMAs respectively.

Table 16: Gini coefficients for the different samples

	All	**Bubyangu**	**Bugitima**	**Buginyanya**	**Tsekululu**	**CRMA=1**	**CRMA=0**
Including forest environmental income							
Gini index	0.50	0.52	0.47	0.45	0.42	0.48	0.48
Excluding forest environmental income							
Gini index	0.57	0.62	0.52	0.55	0.46	0.56	0.55
Difference	0.07	0.10	0.05	0.10	0.04	0.08	0.07

It can be seen that park income still has a major equalizing effect on local incomes, regardless of the type of sample disaggregation. However, magnitudes of the change in Gini coefficients vary considerably, with relatively small changes of 0.04 and 0.05 units in Tsekululu and Bugitima sub-counties respectively, compared to quite large changes of 0.1 units both in Bubyangu and Buginyanya sub counties. Hence, a pattern revealing a larger equalizing effect of forest environmental income on distribution for communities situated in areas with CRMAs does not emerge. Then, how can the results be interpreted instead?

It makes sense to look back at the absolute forest environmental incomes, where it was seen that it were Bubyangu and Buginyanya sub-counties that had the highest absolute incomes from forest product collection. Households from Tsekululu, where the change in the Gini coefficients was smallest, also collected the least forest products. And as far as Bugitima is concerned, it can be stated that forest environmental income played an on average smaller role for total income, reflected by the small value for relative forest income of 0.17, as compared to the overall average of 0.32.

Does that mean that CRMAs do not have an impact on income inequality at all? Splitting the sample according to their participation in collaborative resource management reveals differences in the inequality, as can be seen below in Figure 6. The distribution of income in agreement parishes is indeed closer to a normal distribution than for non-agreement parishes. However, it is not possible to prove whether this is due to better access to forest resources or because of better access to other resources such as land, education and so forth.

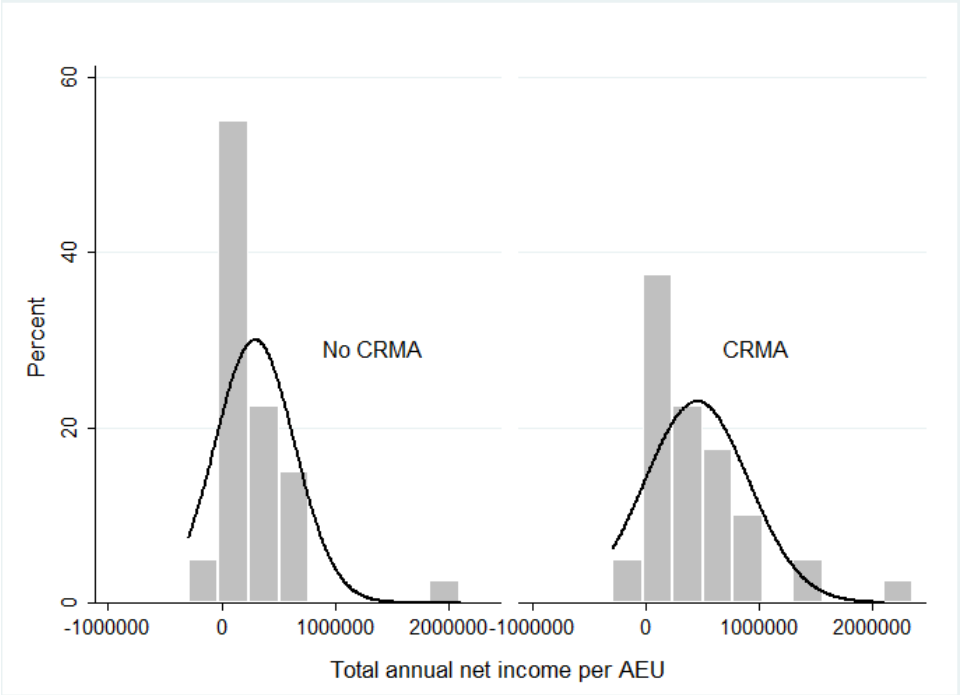


Figure 6: Distribution of total annual net income per AEU by participation in CRMA

To sum up, an equalizing effect of forest environmental income on income distribution(s) around MENP could be observed, but it was not per se stronger for parishes benefiting from CRMAs. That is to say that the magnitude of equalization depends on a number of other characteristics as well, for example the opportunities for alternative income generation activities etc.

As with all statistical measures, the use of the Gini coefficient has advantages and disadvantages. Major disadvantage is that it doesn't indicate whether income levels are rather low or high, it merely describes the spread of the distribution, irrespective of the actual level of this distribution. Second, Lorentz curves may intersect, leading to two identical Gini coefficients for two significantly different distributions. Hence, in order to better assess the role of CRMAs in terms of their ability to reduce income inequality and poverty, it is

necessary to include further measures in the analysis, such as the headcount index, the poverty gap index and the squared poverty index. With these measures it becomes possible to supplement conclusions on forest environmental income and inequality with insights on poverty prevalence, depth and severity among the sample population.

5.5.2 Poverty

Before looking at the outcomes of the different poverty measures that were calculated for the analysis of this thesis, it seems worthwhile to briefly define the underlying concepts of poverty used in this work. However, due to the limited scope of this work, and its econometric analysis approach, this discussion will focus on the measurable aspects of poverty only, and not on the deep and still-controversial conceptual issues (Deaton 1997) in deciding how to define poverty in the first place.

One such approach to divide a population into poor and non-poor is that of placing its members below or above a poverty line, which is most commonly defined by "the level of per capita consumption that permits the individual to satisfy basic nutritional requirements expressed in calories, given the measured share of food in the per capita expenditure of the poor" (Ellis 2000: 78). For the purpose of this thesis, a poverty line of 155,223.8 UgShs per AEU, calculated recently for a similar work, was used.

Another approach defines the poor as those that lack assets or the access to them, and thus takes up the notion of wealth rather than income. Ellis remarks that in "a rural context, landlessness is observed to be a highly accurate predictor of poverty" (Ellis 2000: 78), so too is the lack of human capital due to bad health and poor education.

Yet, no single measure can combine all the different facets of poverty. This is why in the following a class of several measures is used to explain the prevalence, depth and severity of poverty for a given population. It is mainly based on income and the particular measures are then the headcount index, the poverty gap index and the squared poverty gap index, and they all belong to the Foster-Greer-Thorbecke class of measures. This is denoted by:

$$P_{\alpha} = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{z - y_i}{z}\right]^{\alpha}$$

There, α is a so-called poverty aversion parameter, n is the total number of individuals in the population, q is the total number of poor individuals, z is the poverty line and y_i is the income of individuals below the poverty line, with $i=1, 2, ..., q$. Then, according to a specific value of α, these measures become:

$P_0 = (q/n)$, which is the headcount index;

$P_1 = 1/n \sum[(z - y_i)/z]$, the poverty gap index; and

$P_2 = 1/n \sum[(z - y_i)/z]^2$, the squared poverty gap index.

The headcount index is the easiest measure of all and simply represents the ratio of people falling below a pre-determined poverty line z. This index does however not give any information about the depth of poverty. Do people fall only slightly below the poverty line or is their income dramatically lower than z?

Calculating the poverty gap index takes this shortfall into account. There, incomes of those that fall below the poverty line are compared with the poverty line itself, and by that giving an idea about the depth of poverty. Again, this measure does not capture the whole picture, as it does not "capture variations in income distribution amongst the poor. For example, two populations, one exhibiting relatively equal poverty gaps from the poverty line, and one exhibiting highly unequal poverty gaps, might giver rather similar levels of the poverty gap index, due to the simple averaging involved in its formula" (Ellis 2000: 83).

Therefore, the squared poverty gap index is calculated, where the squaring of the differences between income and poverty line ensures "that the larger poverty gaps of the extremely poor count more in the calculation than the smaller poverty gaps of the less poor" (Ellis 2000: 83).

Table 17 summarizes estimates of the poverty measures for the total sample, the different study sites and participation groups, with forest income being both included and excluded. The first thing to mention is that the overall headcount index of P_0=0.275 is somewhat lower than the national headcount index of Uganda (P_0=0.311), and even lower than the regional headcount index for Eastern Uganda (P_0= 0.359). Regional values range from 0.15 to 0.35, whereas the value for the areas without collaborative resource use agreements is higher than that for areas with agreements. The same calculations without forest environmental income yield consistently higher values for poverty prevalence, with values rising beyond 50%, e.g. in Tsekululu sub-county. None of the differences are significant.

Table 17: Poverty measure estimates

	Total sample	Bubyangu	Bugitima	Buginyanya	Tsekululu	CRMA=1	CRMA=0
Including forest environmental income:							
• Headcount Index (P_0)	0.275	0.300	0.150	0.300	0.350	0.225	0.325
• Poverty Gap Index (P_1)	0.157	0.149	0.065	0.212	0.201	0.138	0.175
• Poverty Gap Index² (P_2)	0.116	0.101	0.054	0.150	0.190	0.107	0.125
Excluding forest environmental income:							
• Headcount Index (P_0)	0.438	0.500	0.250	0.450	0.550	0.350	0.525
• Poverty Gap Index (P_1)	0.273	0.292	0.140	0.365	0.293	0.292	0.253
• Poverty Gap Index² (P_2)	0.230	0.245	0.114	0.341	0.215	0.230	0.227

Looking at the poverty gap index measuring the depth of poverty, reveals that it is highest for Buginyanya, both when environmental income is included and excluded, which is a surprising result. From former analyses it is known that the Gini coefficient for Buginyanya is below the mean value of 0.5 for the total sample, and that it has the by far highest mean estimate of wealth including the values of land, livestock and personal belongings. It seems that assessing poverty entirely by measures of the FGT class of measures might be misleading, pointing at the well known controversy of using either income or wealth indicators for assessing economic well-being.

Lastly, also the measures for severity differ considerably. At first it is highest in Tsekululu sub-county, but after park income is excluded it was highest for Buginyanya, taking on a value of 0.341, which is quite substantial. Also, with forest environmental income included in the total income, poverty measures score worse for parishes without agreements compared to parishes with agreements, but once this type of income is excluded, depth and severity of poverty appear to be more severe in areas benefiting from CRMA's. What does this say about the role of CRMAs? Hypothetically, CRMAs contribute to a reduction in poverty, but whether this level of poverty would be that high in the first place if CRMAs were absent, cannot be answered. This is to say that there is a slight chance that CRMAs induced a certain level of poverty by making people dependent on environmental income, resulting in a bigger focus on this type of 'last resort employment'.

To sum up it can be noted that no direct effect of poverty reduction for CRMAs could be observed. Rather, the lower overall poverty measures prevailing in parishes with agreements

are mainly due to the low values for Bugitima sub-county. On the contrary, Buginyanya, benefiting the most from forest environmental income, exhibits amongst the biggest depth and severity of poverty both with and without environmental income being considered in the income analysis.

6. Conclusion and research recommendations

"Protected areas retain the potential to either alleviate poverty or to contribute to its severity, depending on how they are managed."[11]

The "proximate causes of forest conversion include the spread of small-scale farming, commercial logging, fuelwood gathering and intensive grazing from domestic animals in that order of severity" (Perrings 2000: 116). This insight has led to a worldwide trend of establishing forest protected areas, initially following a strict 'fences and fines' conservation approach, with Uganda being among those to join this trend.

Yet, in order to cope with the severe conflicts that arose between the park neighbors and park staff in the aftermath of the creation of Mount Elgon National Park (MENP), the Ugandan Wildlife Authority introduced a number of community conservation instruments, one of which is called 'collaborative resource management agreement' (CRMA). These agreements are meant to give the local poor limited access to the park's resources so as to ease the adverse economic (and other) effects that they experienced as a consequence of the rigorous implementation of the government's conservation policies.

Due to a lack of funding and the inability of MENP to create enough revenues from tourism, costly agreements have not been (re-)negotiated all around the park, but in some few communities only. Main objective of this work was therefore to examine the actual impact of CRMAs, i.e. to compare how communities not benefiting from CRMAs cope in terms of economic performance as compared to communities benefiting from CRMAs. Specific questions asked were amongst others how the two differing types of communities performed with regard to income and wealth generation and also whether they differed with respect to dependence on forest environmental income. Moreover, the degree and pattern of livelihoods diversification were analyzed and compared across sub-samples. Lastly, the distribution of income has been examined across study sites, aiming at identifying whether CRMAs have an impact on inequality and poverty in the communities where they are implemented.

Some of the main results are presented in the following, starting with the sub-samples' income and wealth outcomes. Communities situated in areas with CRMAs performed on

[11] Cavanagh (2011: 1)

average better than communities from non-agreement areas, not only in terms of total income, but also with respect to most of the sub-incomes. The most striking difference was that in cash income from crop cultivation, probably due to two reasons, namely the larger landholdings, and benefits from boundary management agreements allowing local people to cultivate low shade crops in the buffer zone of MENP. However, the first effect it expected to dominate the second one.

On the contrary, differences in total farm net income were relatively small across areas with and without agreements, which was mainly due to the higher expenses on livestock prevailing in agreement parishes. In this respect it was found out that the poorest households in areas with CRMAs use forest environmental income as a means to offset losses from livestock expenses. Whether this is a deliberate or forced strategy remains undecided. As a consequence, however, they exhibited a much higher degree of forest dependence than their poor counterparts from non-agreement areas, i.e. approximately 80%. Similar holds true for less poor households from agreement parishes and a major result is thus that dependency is higher in areas with CRMAs. Thorough analysis revealed, however, that this effect is mainly due to one of the two study sites, Buginyanya.

Next, a number of multiple linear regression analyses revealed a significant effect of CRMAs on households' wealth level rather than income level. This can be partly explained by the differing concepts of income and wealth. Whereas annual income is a measure of short-term rather than long-term economic performance, the wealth level indicates whether a household can be expected to cope with shocks or downward trends in the future, which is supposed to be easier with a bigger stock of assets. The fact that an impact of CRMAs on total annual household income could not be confirmed by the data makes a clear 'effect-causality' between economic performance and CRMAs less likely. As was seen, absolute environmental income was quite similar across parishes. It was crop income that introduced most of the difference in total income across sub-samples. This is again pointing toward a relatively small actual effect of CRMAs on overall economic performance.

Extensive diversification prevails around MENP, with some households engaging in up to seven different income activities. More diversification was found to lead to higher income. Yet, no particular difference in the degree or pattern of livelihoods diversification across areas with and without agreements was found, except for a somewhat higher importance of forest activities in agreements with collaborative resource access agreements. Also, more on-farm

diversification prevailed in these parishes, but it is very likely that this is due to their larger landholdings, rather than the possibility to cultivate in the boundary zone.

As for the issue of distribution, it was found that forest environmental income, both for areas with and without agreement, significantly decreased income inequality. The same yields true for poverty. It was seen, that households not benefiting from CRMAs were on average poorer than the households benefiting from CRMAs. Surprisingly, the exclusion of forest environmental income from total income revealed that communities benefiting from CRMAs were actually poorer, both in terms of severity and depth, than communities located in Bubyangu and Tsekululu sub-counties, but not so in terms of poverty prevalence. Again, this effect is mainly due to the effect from Buginyanya sub-county, and indicates that CRMAs are indeed a valuable source of income – especially for the lower income groups. It needs to be remembered that income and wealth performance of the poorest people in the sample differed extremely, with Buginyanya being much richer, despite its poor income performance. This may again point at CRMAs being used as a means to smooth consumption, rather than to build up a stock of wealth through cash accumulation.

In order to draw more accurate conclusions on the impact of CRMAs it was necessary to investigate the targeting process used by the Ugandan Wildlife Authority to select villages for negotiating resource use agreements. As was found out, even though all communities do have the same legal right to enter into an agreement, those villages exhibiting a good relationship with the Ugandan Wildlife Authority are the villages chosen for CRMAs, as was confirmed in an interview with MENP staff[12]. Hence, where community members are more cooperative, chances are higher to enter into a successful partnership with the park authority.

Scrutiny of the sub-samples socio-demographic characteristics revealed furthermore that households from parishes benefiting from CRMAs were on average smaller, had better educated household heads, possessed larger landholdings, lived further away from the park boundary, and had younger household heads. Theory suggests that most of these characteristics tend to decrease the magnitude of dependency on the park's resources. Indeed, many findings recalled above point at the notion that the socio-demographic differences did not developed as a consequence of the park's policy but rather that the park management requires communities to fulfill specific characteristics for an agreement to be issued. Simply speaking, it was concluded that differences in economic performance and socio-demographic characteristics were due to selection, rather than evolved as an effect of CRMAs. This is not

[12] Interview with community conservation warden G.R. Matanda at MENP headquarter, 19th January 2011

to say that there is no effect of agreements on household's economic performance. Yet, most interestingly this study revealed the highly discriminating practice of the Ugandan Wildlife Authority of granting better off communities the privilege to cooperate. As was learned as well, often the very same communities benefiting from CRMAs also get to benefit from boundary management and revenue sharing, reinforcing the benefits from being privileged.

Yet, by punishing more demanding communities and rewarding those asking for less, prevailing conflicts won't be solved and the objective set by the Ugandan Wildlife Authority to sustainably manage the park's resources "for the benefit of the people of Uganda" (UWA 2009: 22) won't be met. On the contrary, by privileging a few, and excluding the majority, conflicts, including encroachment, will be further fuelled.

Recent research on this topic confirms the findings of this work, e.g. Cavanagh (2011) noted that as of today all of the community resource access agreements are located in the districts that receive the most economic benefits from MENP. Yet, the findings of this case study are very context-specific, and cannot easily be inferred to the rest of the parishes bordering MENP. It is therefore important and interesting to further examine to which extent these findings hold true for the rest of MENP and for other national parks in Uganda. Although it is understandable that the Ugandan Wildlife Authority wants to pool its scarce resources in the most promising projects, some of the conflicts prevailing around MENP might be reconciled simply by distributing funds more evenly among the park's communities. But again, specific policy recommendations require more systematic research on this topic to begin with.

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Appendix: **Mt. Elgon National Park Livelihood Survey, Household Questionnaire 2011**

Questionnaire No.: Date: Village: Parish:

Sub-county: County: Distance to the park boarder:

1. Basic household information

1.1. Household members

HH members	Sex (m/f)	Relationship to HHH[1]	Age	Education	Main occupation[2]	Secondary occupation	Other occupation
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

[1]*Relationship:* *1=HHH, 2=wife, 3=child, 4=dependant, 5=laborer, 6=others, specify*

[2]*Occupation:* *1=prod./sale of crops* *2=prod./sale of livestock* *3=beer brewing* *4=agricult. input trading*
5=carpentry/lumbering *6=crafts/art* *7=trading agricultural output*
8=shop keeper *9=brick making* *10=service provider*
11=charcoal burning *12=gov. Employee* *13=NGO employee*
14=selling bushmeat *15=casual laborer* *16=remittance income*
17=tourist guide *18=school* *19=other, specify*

1.2 For how many years have you been living in this village?_____

1.3 Where have you been living before you moved here? _____

1.4 What was the reason for moving here? _____
(1=availability of land, 2=employment, 3=family, marriage, 4=conflicts, 5=CMRA, 6=others, specify)

2. Household assets

2.1 What is the number of buildings you own locally? _____

2.2 What is the number of buildings you own elsewhere? _____

2.3 Which materials is the locally owned house made off?
(1=Iron sheets, 2=grass, 3=bricks, 4=mud & wattle, 5=cement, 6=others, specify)

a) Roof: _____
b) Walls: _____
c) Floor: _____

2.4 What is the size of the household farmland in acre? _____

2.5 Specify the tenure of the land: _____
(*1=own land, 2=rented land, 3=borrowed land, 4=communal land, 5=other, specify)*

2.6 Did the size of your land change over the past 12 months? If yes, why? _____

2.7 What are the main problems, if any, with your land? _____

2.8 How much UShs would you
(a) pay for an acre of land: _____
(b) demand for one acre land: _____
(c) spend on renting an acre land: _____
(d) let out (monthly) an acre of land: _____

2.9 Do you own machinery or other major assets, such as cars, motorcycles, bicycles, TVs or radios? If yes, fill out:

Type of asset	Amount	Total value

2.10 Do you possess any financial assets or savings? If yes, how much? _____

2.11 Do you have access to loans? If yes, what kind of loan? _____

3. Livestock ownership and exchange

3.1 Livestock last 12 months

Animal type	# 12 m ago	Value 12 m ago	Sold	Died	Slaught-ered	Given out	Bought	Receiv-ed	# now	Value now
Cows										
Bulls										
Calves										
Goats										
Sheep										
Pigs										
Chicken										
Turkey										
Duck										
Others										

3.2 What were the inputs associated with livestock ownership during the past 12 months?

Type of input	Total cost of input
Medicine/veterinary service	
Dipping	
Herding	
Motorised transportation	
Licks	
Fodder (incl. husks)	
Renting of land (incl. stubble)	
Other (incl. fines)	

4. Income from animal products

4.1 Meat production from cattle last 12 months

Season	Period	# of cattle slaughtered	% of meat sold	Income from one animal	TI from meat sales
1					
2					
3					
4					

4.2 Meat production from goats last 12 months

Season	Period	# of goats slaughtered	% of meat sold	Income from one animal	TI from meat sales
1					
2					
3					
4					

4.3 Milk production from cows last 12 months

Season	Period	# of milk cows	Production litres/day	% of milk sold	Price in USh/litre
1					
2					
3					
4					

4.4 Milk production from goats last 12 months

Season	Period	# of goats	Production litres/day	% of meat sold	Price in USh/litre
1					
2					
3					
4					

4.5 Other livestock income last 12 months

Type	Total # produced	Total # sold	Total cash income
Butter			
Eggs			
Hides			
Other			

5. Crop production and sale

5.1 Crops and vegetables cultivated the last 12 months:

Crop	Unit produced	# produced	Unit sold	# sold	Price	Income in USh

5.2 Expenditure on farm inputs last 12 months

Input (for seed, specify crop)	Total cost
Seed,	
Seed,	
Seed,	
Seed,	
Seed,	
Seed,	
Fertilizer	
Pesticides	
Other inputs	

5.3 Hiring of labor for cultivation last 12 months

Activity	How many?	Total man-days	Total payment

(*Activity: 1=ploughing, 2=planting, 3=weeding, 4=harvesting, 5=cutting firewood, 6=other, specify)*

5.4 Hiring of equipment (machines, oxen) last 12 months

Type of equipment	Activity	How many?	Total payment

(*Activity: 1=ploughing, 2=planting, 3=weeding, 4=harvesting, 5=cutting firewood, 6=other, specify)*

6. Environmental income

6.1 On a scale from 1 to 5, *with 1=twice or more a week, 2=once a week, 3=2-3 time a month, 4=seldomly and 5=never,* how often do you collect resources from a) inside the park _____ and b) outside the park? _____

6.2 Income from forest and woodlands last 12 months:

Type	Unit	collect-ed/week	..outside the park	..inside the park	hours /week	consum ed/week	sold /week	bought /week	price / unit	TI
Charcoal										
Fire-wood										
Fodder										
Poles										
Bamboo										
Ropes										
Mush-rooms										
Vege-tables										
Honey										
Licks										
Medi-cine										
Grass										
Water										
Other										

6.2 Which of the above named resources are typically collected by a) women: _____
b) men: _____
c) kids: _____

6.3 What is the main purpose of collecting from within or outside the park (*subsistence, shortfall or cash*)?

6.4 On a scale from 1 to 7, *with 1=excellent, 2=very good, 3=good, 4=indifferent, 5=bad, 6=very bad, 7=severe conflicts*, how would you describe the relationship to UWA (rangers)? _____

6.5 Are you aware of the existence of an active collaborative resource management agreement in your village? If yes, what kind of collection does it allow? _____

6.6 Has your collection of resources from the park increased, decreased or not changed at all since 1993?

6.7 Would you say that the communities' resource harvesting is sustainable or did you experience significant differences in the accessibility of certain resources?

7. Other income sources

7.1 What type of wage labour did members of the household engage in during the last 12 months?

Who in the HH?	Type of work	Employer	Period	Wage	Total income

7.2 Did the household have income from other businesses during the past 12 months?

Who in the HH?	Type of business	Total net income

7.3 Were there other income sources available during the past 12 months?

Source	Where/to whom?	Total net income
Gov. support		
Remittances		
Sale of beer		
Hiring out equipment		
Other		